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UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Service
Crops Research Division
Vegetables and Ornamentals Research Branch
Potato, Onion and Root Crop Section
Beltsville, Maryland

THE NATIONAL POTATO-BREEDING PROGRAM, 1957

By
Robert V. Akeley and Others,
and
State Cooperators

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(Twenty-Eighth Annual Report to Cooperators)
Plant Industry Station
Beltsville, Maryland

March 1958

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NATIONAL POTATO-BREEDING PROGRAM, 1957

By Robert V. Akeley

New Varieties

Six varieties were released for commercial production in 1957; Norland, Norgleam, and Nordak by North Dakota; Excel and Haig by Nebraska, and Huron by Canada. Norgleam and Nordak are subs from a self-pollination of ND 457-1. Both varieties have white skin, early maturity, excellent cooking qualities, early-yielding ability, good tuber type, shallow eyes, and resistance to virus Y. They are, however, susceptible to late blight, scab, and sun greening. Norland, from a cross between Redkote and ND 626, has the same maturity, cooking qualities, yielding ability, and tuber type as the two varieties previously mentioned, plus a bright-red skin. It has scab resistance but is susceptible to late blight, silver scurf, and other diseases common to the potato. Excel is a white selection from a cross between 143.47-16 and Neb. 59.41-P1. It is late in maturity and rates medium for total solids content. Haig, a white selection from a cross between Cayuga and Minn. 43, has scab resistance, early maturity, and rates medium for total solids content. It is suitable for chipping prior to storage. Huron, a new scab-resistant variety, originated in the National Potato-Breeding Program of Canada. It has high yielding ability, medium to high rating in total solids, and considerable resistance to early blight.

Promising Selections

B 73-3 is a medium-maturing, late-blight resistant, white selection that looks very good in South Carolina. It is being increased for commercial tests (shipping and chipping) before a decision is made concerning its release. B 2368-4 is a late-maturing, high-yielding, scab-resistant red selection that shows promise in Texas and several other production areas. It is also being increased for commercial tests before a final decision is reached concerning its release. TL 1859, a light red selection from Louisiana, has scab and late blight resistance, excellent cooking quality and yielding ability. A mutation to a deeper red-skin color would make this seedling very acceptable to the trade. It has been tested in several southern and northern States and has shown superior performance. A 180-26, a late-maturing seedling, with russet skin, originated in Idaho. It has possibilities as a commercial variety because of its resistance to scab, verticillium wilt, virus A, and tuber necrosis due to seasonal leafroll infection. C.S. 12,240 and C.S. 13,178 are selections being considered for release from Colorado. Both selections have white attractive tubers, yielding ability, and bake and chip well before and after storage.

Golden Nematode

Since 1954, the United States Department of Agriculture and the Agricultural Experiment Station of Cornell University have been cooperative on a breeding program to develop eventually commercial sorts that are highly resistant to, if not immune from the attacks of golden nematode. A series of backcrosses

have been accomplished on resistant S. andigenum selections and valuable parents with multiple-disease resistance have been selected. Golden-nematode-resistant selections B 4158-1 and B 4158-5 possess white tubers, medium maturity, immunity from latent mosaic, and resistance to late blight and scab. Seedlings B 4159-5 and B 4159-8 possess all the previously mentioned characteristics, plus resistance to verticillium wilt. One other selection, B 3944-29, has white tubers, late maturity, immunity from mild mosaic, and resistance to late blight, ring rot, and golden nematode.

Southern Bacterial Wilt

Promising resistance to southern bacterial wilt has been found in the following species: S. pinnatisectum, S. pinnatisectum var. heptozygum, S. sambucinum, and S. andigenum - S. tuberosum hybrids. Mild resistance of some economic value has been observed in Sebago and several seedlings. Two U.S.D.A. parents, B 2969-15 which had resistance to scab and late blight, and B 3159-1 which had resistance to scab, late blight, and leafroll in Maine, were reported by F. F. Guimaraes from tests in Brazil to have shown a high degree of resistance to southern bacterial wilt. Seedling B 2969-15 showed no infection and B 3159-1 showed only 2 percent for 1 year only after they had been planted in a severely-infested field for 8 consecutive crops. Breeding for commercial varieties with a high degree of resistance to this disease should proceed more rapidly now that a good source of resistance has been found in parents of the common potato (S. tuberosum).

Potato Cytogenetics

At Sturgeon Bay, in 1956, a series of matings between S. tuberosum (female, tetraploid) and Solanum species (male, diploid) were made. Among 37 seedling families resulting from 6,041 pollinations, 29 haploid seedlings ($2n=24$) of S. tuberosum (common potato) were found. Crossability of these haploids with Solanum species is now being tested. So far, matings with 5 diploid and 1 tetraploid species have produced viable seed. It is hoped and expected in the future that these or similar functional haploids ($2n=24$) from the common potato ($2n=48$) may be useful and will simplify genetic studies and analyses of the inheritance of characters at the diploid level.

Red-Skin Color

Two parents, B 3309-8 and B 3454-5, were crossed with B 3139-24. Approximately 81 percent of the segregates from the cross with B 3309-8 and 92 percent of those from the cross with B 3454-5 had red skin. Several red parents have been selected on the basis of breeding behavior that will produce segregates that are all red for skin color when they are selfed, crossed with another red parent, or crossed with a white one. This indicates a high degree of homozygosity for red color is present in these parents. Incorporation of many desirable characters into acceptable red varieties with red skins should be easier and quicker if these or similar parents are used.

Evaluation of Species

At Beltsville, Maryland, 1957, 216 introductions were screened and evaluated for their reaction to viruses X, Y, leafroll, and verticillium wilt with the following results: 15 uninfected with virus X, 29 uninfected with virus Y, 14 were resistant and 5 highly resistant to leafroll, and 32 showed some resistance to verticillium wilt, plus 10 more that were completely symptomless to wilt.

PLANT INDUSTRY STATION (Beltsville, Md.) and
CHAPMAN AND AROOSTOOK FARMS (Presque Isle, Maine.)

R. V. Akeley, R. W. Buck, Jr., A. E. Schark, R. E. Webb, M. J. O'Brien,
E. S. Schultz and G. V. C. Houghland.

Plant Industry Station

At the Plant Industry Station, Beltsville, Md., in 1957, the crossing and selfing was continued. Due to cloudy weather pollinations were not as successful as they were in 1956, but ample seed of desirable combinations were obtained. Combining as many horticultural characters and disease and insect resistances into acceptable parents as possible is the objective. The following disease- and insect-resistant factors were involved: late blight, scab, ring rot, leaf roll, verticillium wilt, brown rot, net necrosis (leaf roll), corky ring spot; viruses X, A, Y, and S; leafhopper and golden nematode. The main horticultural factors of the parents such as tuber shape, skin color (red, white, and russet), and percentage of total solids were taken into consideration as well as the natural fertility and maturity of the parent.

Distribution

The distribution of potato seed, new seedlings, and tubers of named and numbered varieties was continued. A summary of the shipments is given in P. I. tables 1, 2, and 3. The seed, new seedlings, and small lots of seed stock for States and foreign countries were shipped from Plant Industry Station, but many of the larger shipments were made directly from Presque Isle, Maine.

Chapman Farm, Maine

Twenty-four promising seedlings and 7 newer varieties were increased in various amounts on the Chapman Farm. Saco, Plymouth, Merrimack, Cherokee, and B 2368-4 were among the varieties and selections increased for future tests and distribution.

P. I. table 4 summarizes the maturity and fertility data on the 10-hill rows grown at Chapman Farm in 1957. The degree of fertility in the field depends greatly upon weather conditions, particularly temperature. Temperature was not ideal for maximum fertility this year as many days during the flowering period were hot and dry. Of the total number of seedlings, 77.3 percent were judged early to medium in maturity, and 71.4 percent slight to good in fertility. About 36 percent of the 10-hill plots were selected for parents for distribution to cooperators or for further tests in 1958.

Approximately 25,697 seedlings representing 113 family lines grown in the greenhouse in Beltsville, Md., were planted for increase and selection on the Chapman Farm. Germination averaged 94 percent for all seedlings. Approximately 4 percent, or 1,056 seedlings, were selected at harvesttime

for increase in 10-hill rows and inclusion in 12 different disease and quality tests in 1958 (see P. I. table 5). This figure excludes 1,750 selections saved for vitamin C tests at Cornell University, Ithaca, New York. An additional 800 seedlings grown by A. E. Kehr, Iowa State College, were planted for increase and selection on the Aroostook Farm.

P. I. table 1. Distribution of potato seed and new seedlings from greenhouse at Beltsville, Md., 1957.

Country or State	Cooperator	Number of progenies	Number	
			Tubers	Seed
Mexico	John S. Niederhauser	26	3,086	
Alaska	C. H. Dearborn	17		9,975
Colorado	W. C. Edmundson	25	3,739	
Idaho	J. G. McLean	23	3,661	
Iowa	A. E. Kehr	28	4,387	
Louisiana	T. P. Dykstra	12	2,647	
Maine	R. Bonde	11		2,210
Maine	A. E. Schark	129	28,303	
Maine	G. S. Simpson	22	5,224	
Maryland	R. E. Webb	9		1,825
North Dakota	W. G. Hoyman	30	4,940	
Ohio	J. P. Sleesman	3	464	
West Virginia	K. C. Westover	27	3,729	
Wisconsin	F. J. Stevenson	30	3,693	
Wisconsin	F. J. Stevenson	55		19,600

P. I. table 2. Distribution of named and numbered varieties to foreign countries, 1957.

Country	Cooperator	Number of varieties
Australia	N. S. Shirlo	2
Belgium	N. Rigot	3
Bolivia	Plant Introduction	14
Brazil	M. F. Koehnke	13
Canada	R. H. Bagnall	14
Casablanca	E. Azzopardy	1
Czechoslovakia	Roman Skokan	8
Ceylon	Plant Introduction	12
Denmark	A. S. Knudson	1
Germany	W. Rudolf	8
Germany	J. B. Halpern	2
Honduras	Dept. of Experiment Sta.	12
Italy	G. Zanotti	9
Libya	E. Easton	15
Nepal	R. A. Pendleton	5
Nicaragua	G. F. Freytag	8
Scotland	T. McIntosh	1
Thailand	Plant Introduction	5
Turkey	K. Ilisulu	8

P. I. table 3. Distribution of named and numbered varieties to territories and States.

Territory or State	Cooperator	Number of varieties
Alaska	C. H. Dearborn	5
California	K. G. Baghott	1
California	W. R. Corrin	3
California	G. N. Davis	23
Canada	G. R. Johnson	8
Canada	J. D. Menzies	1
Colorado	W. C. Edmundson	45
Connecticut	A. Hawkins	14
Delaware	E. P. Brasher	16
Florida	A. H. Eddins	16
Florida	E. N. McCubbin	44
Florida	J. C. Noonan	1
Georgia	J. E. Bailey	12
Idaho	J. M. Raeder	2
Idaho	J. G. McLean	55
Illinois	N. F. Oebker	25
Iowa	A. E. Kehr	44
Kentucky	C. Singletary	10
Maine	R. Bonde	6
Maine	A. E. Schark	57
Maryland	R. E. Webb	1,904
Massachusetts	R. A. Mullany	11
Massachusetts	G. L. McManus	2
Massachusetts	K. J. Kucinski	19
Massachusetts	A. Wolf	3
Michigan	E. J. Wheeler	48
Michigan	H. C. Moore	1
Michigan	C. E. Peterson	4
Michigan	D. Isleib	1
Michigan	M. Anderson	2
Minnesota	C. J. Eide	26
Missouri	J. L. Strominger	8
New Jersey	J. C. Campbell	13
New Jersey	S. Danek	1
New York	R. L. Sawyer	16
New York	L. C. Peterson	117
New York	W. C. Kelley	1,629
New York	P. A. Menges	8
New York	W. C. Mehlenbacher	1
New York	W. G. Been	2
New York	R. L. Plaisted	5
North Dakota	W. G. Hoyman	59
North Dakota	B. Picha	8
Ohio	F. Lower	3
Ohio	J. P. Slesman	33

continued

P. I. table 3, continued.

Territory or State	Cooperator	Number of varieties
Pennsylvania	J. S. Cobb	16
"	L. M. Miller	1
"	E. H. Landis	4
Rhode Island	J. E. Sheehan	25
South Carolina	W. C. Barnes	8
Texas	H. Meyer	45
"	P. W. Leeper	12
"	W. B. Cook	107
"	J. M. Coruthers	20
Virginia	P. H. Massey, Jr.	11
"	F. S. Andrews	6
Washington	C. L. Vincent	8
"	M. W. Carstens	19
"	J. D. Menzies	26
West Virginia	M. E. Gallegly, Jr.	29
Wisconsin	H. M. Darling	96
"	R. Hougas	12
"	R. H. Larson	19
"	G. H. Rieman	30
"	F. J. Stevenson	44
Wyoming	J. R. Vaughn	26

P. I. table 4. Maturity and fertility of seedlings grown in 10-hill rows on Chapman Farm, 1957.

Maturity classes	Seedlings		Fertility ^{1/} classes	Seedlings	
	No.	Pct.		No.	Pct.
Early	359	28.9	None	619	48.2
Medium	599	48.3	Slight	298	23.2
Late	183	14.8	Medium	316	24.6
Very late	99	8.0	Good	50	4.0
Total	1,240	100.0		1,283	100.0

^{1/} Based on the relative number of seedballs set in the field.

P. I. table 5. A summary of single-hill seedlings grown on the Chapman Farm in 1957, showing the total number planted, grown, selected and the number of selections for future tests in 1958.

Planted	Grown	Selected	Late blight	Scab	Ring rot	Viruses			Leaf roll	Net necrosis	Vert. wilt	Vitamin C	Golden	nematode
						A	X	Y						
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
25,697	24,509	1,056	676	583	435	695	285	433	192	154	323	1,750	66	

Ten family lines, segregating for scab, late blight and virus X resistance, were represented. Fourteen selections were made.

The outstanding parent this year, as measured by the number of seedlings selected, was B 3139-24. Approximately 25 percent, or 270 of the total selections made had B 3139-24 as one of the parents. Another good parent was B 3556-12 which was one of the parents in approximately 7 percent of the seedlings saved. B 3139-24 is resistant to scab, late blight, verticillium wilt, ring rot, and virus Y. B 3556-12 is resistant to scab, late blight, leaf roll, verticillium wilt and is immune to viruses X and A.

Aroostook Farm, Presque Isle, Maine

Weather conditions in northern Maine during the planting and harvesting periods were ideal in 1957. It was one of the few years in which snow or rain did not delay planting or harvesting operations. Temperature and moisture conditions were near optimum during the growing season for the spread of late blight.

About 112 leading varieties and promising new selections were grown in the Aroostook increase plots. An additional 216 varieties and selections were increased on a smaller scale. Approximately 130 varieties included in the increase were important American varieties, both old and new. A representative sample of the collection would include Irish Cobbler, Garnet Chili, Green Mountain, Kennebec, LaSoda, Dazoc, and Osage.

All of the plots were planted between the 15th and 22nd of May. Eleven-hundred pounds of 10-15-15 fertilizer was applied to all plots at planting time. A weekly spray consisting of Dithane and DDT was used on all plots from June 10 to September 3. A parathion and Dithane spray was used on July 29 and August 26. Early harvesting of seed potatoes for the 1958 planting was completed by August 14. All of the yield trials except the verticillium wilt plots, were sprayed with sodium arsenate, a vine killer, on September 9, after a roto beater had been used on the plots. The yield trials and breeding plot were harvested the week of September 16.

Yield tests

Thirteen early maturing seedling potato varieties were compared in yielding ability and solids content with the check varieties Irish Cobbler and Cherokee. The data for this test is tabulated in P. I. table 6. The varieties are listed according to yield in hundred weights and bushels per acre. The Canadian seedling F4631 is significantly higher in yield than the next highest variety, Cherokee. It also has the highest percent of U.S.No.1 tubers; and the highest average weight of U. S. No. 1 tubers, of any selection in the test. F4631 ranked third in total solids. The parentage of F4631 includes S. demissum, Irish Cobbler, Katahdin, Green Mountain and the USDA seedling 96-44. The check varieties Cherokee and Irish Cobbler ranked second and fifth in yield. Both Irish Cobbler and F5080, another Canadian seedling, ranked first in total solids. There are no significant differences in yield between Cherokee and the succeeding 5 varieties.

P. I. table 6. Early maturing variety test, Aroostook Farm, Presque Isle, Maine, 1957.

Variety	U. S. No. 1 tubers per acre			Average weight	Solids
	Per	Acre	Pct.	Oz.	Pct.
	Cwt.	Bu.			
F4631	385	642	97.3	6.4	21.6
Cherokee	348	580	96.2	5.8	21.3
B 3140-36	326	544	93.1	5.4	21.6
B 3454-5	324	540	89.7	4.1	20.0
Irish Cobbler	322	536	91.3	5.5	23.0
B 3604-19	320	533	95.4	5.4	20.5
F5080	314	523	95.7	6.3	23.0
B 2922-26	305	508	99.6	4.8	20.2
CS 11889	288	480	93.6	5.2	20.5
B 3622-4	278	463	91.4	4.8	21.4
B 3454-14	271	452	88.9	4.5	19.4
B 3428-41	268	447	89.8	4.4	21.7
CS11888	259	431	93.6	5.2	20.5
L.S.D. .05 level	35	59			0.7

Sixteen medium-maturing varieties were compared in yielding ability, solids content and average size with the check variety Chippewa (P. I. table 7). The Louisiana seedling LA 3769 was significantly higher in yield than all of the remaining varieties in the test. It also had the highest percent of U. S. No. 1 tubers. However, it was the lowest variety in percent of total solids and had an undesirably high average tuber weight. Osage had the highest percentage of total solids, but ranked last in yield.

Ten late maturing seedling selections and the variety Kennebec were compared in yielding ability with the late variety Katahdin (P. I. table 8). A significant difference was not apparent between the two highest-yielding selections, B 2368-13 and B 3453-2. B 3453-2 had the highest solids content and B 2368-13 the highest percent of U. S. No. 1 tubers. Both varieties were satisfactory in average tuber weight. B 3424-11 and B 137-5 ranked last in total solids.

In general, the highest yields were found in the late maturing yield test, and the highest percentage of total solids in the early maturing test.

P. I. table 7. Medium maturing variety test, Aroostook Farm, Presque Isle, Maine, 1957.

Variety	U. S. No. 1 tubers per acre			Average weight	Solids
	Cwt.	Bu.	Pct.	Oz.	Pct.
La 3769	439	731	97.2	7.7	18.4
B 3710-1	404	675	94.3	6.3	20.2
B 3819-17	403	672	94.4	5.8	20.4
B 3692-4	392	653	93.6	6.0	19.4
Chippewa	392	653	93.3	5.4	19.0
B 3353-9	372	620	95.1	7.1	19.1
B 3319-30	365	608	92.3	5.0	19.8
B 2874-4	364	606	93.1	5.7	20.8
B 3604-1	356	594	93.6	5.6	20.8
B 3696-13	351	585	94.9	6.2	20.2
La 4112	350	583	98.2	9.3	20.3
Red LaSoda	346	577	94.4	5.6	19.8
Dazoc	363	545	90.7	5.1	20.3
Sheridan	316	527	90.5	4.8	20.3
B 3427-7	289	482	87.7	4.9	19.5
Osage	266	444	94.4	6.2	21.1
L.S.D. .05 level	35	59			0.6

P. I. table 8. Late maturing variety test, Aroostook Farm, Presque Isle, Maine, 1957.

Variety	U. S. No. 1 tubers per acre			Average weight	Solids
	Cwt.	Bu.	Pct.	Oz.	Pct.
B 2368-13	421	702	95.3	6.1	20.8
B 3453-2	393	654	92.7	5.2	21.7
Kennebec	376	626	96.4	8.7	21.7
B 3424-11	348	597	95.5	6.2	19.9
La 1859	354	590	94.2	6.3	20.5
Katahdin	332	554	93.8	5.7	20.2
B 137-5	318	530	88.7	6.1	19.9
B 3140-36	316	527	91.4	5.4	20.9
B 579-3	228	380	86.6	4.4	23.1
B 3913-7	232	387	75.6	4.1	21.8
L.S.D. .05 level	43	71			0.3

Effect of total solids content of seed on yield and dry matter-content of three varieties

Tubers of the three varieties, Kennebec, Green Mountain and Merrimack were separated into 3 specific gravity classes by means of salt solutions. The specific gravity of the 3 classes were as follows: high, $1.090 \pm .001$; medium, $1.080 \pm .001$; and low, $1.070 \pm .001$. Uniform seedpieces, averaging as close as possible to 2 ounces, were planted in a randomized design on May 2. P.I. table 9 summarizes the results obtained. The yields between varieties were the only significant differences observed. No significant differences were found in specific gravity classes, or in the variety-specific gravity interaction.

P. I. table 9. Effect of total solids content of seed on yield and dry matter content of three varieties, Presque Isle, Maine, 1957.

Variety	U. S. No. 1 tubers per acre			Mean
	High S.G. ^{1/}	Medium S. G.	Low S. G.	
	Cwt.	Cwt.	Cwt.	
Kennebec	408	401	394	401
Green Mountain	374	344	374	364
Merrimack	306	294	282	294
Mean Cwts.	363	346	350	
L.S.D. between two variety means .05 level, 23 pounds				

^{1/} High = $1.090 \pm .001$ specific gravity
 Medium = $1.080 \pm .001$ " "
 Low = $1.070 \pm .001$ " "

Dates of seed cutting and dehydration for 4 varieties

Tests on dates of seed cutting and seed dehydrating were continued in 1957. The advantage of early cutting of seed, and dehydration of cut seed was discussed in the 1956 report.

Beginning on February 1 and at monthly intervals thereafter, 2-bushel samples of the varieties, Kennebec, Katahdin, Sebago, and Irish Cobbler, were cut into 2-ounce seedpieces. When the farm storage temperature dropped below 40°F., the varieties were brought out into a warm workroom (50° to 60°F.) for 2 days before cutting. After cutting, the seedpieces were placed in a 60-pound crate and covered with moist burlap sacks for a day before they were returned to the common storage. Winter temperatures in the storage varied between 36° and 40°F.

On May 17 the seed was divided into four dehydration treatments as outlined in P. I. table 11, and placed in an air drier at a temperature of 70°F. Considerable difficulty was experienced in removing 30 and 45 percent moisture from seed cut in February and March. Therefore, on May 20, the drying temperature was increased to 80°F., and a few days later it was raised again to 100°F. On June 2 the last of the treatments were removed from the dryer, and on June 3 the experiment was planted.

The effect of cutting dates on yield is tabulated in P. I. table 10. Significant differences were found between varieties and between dates, however, the interaction, dates X varieties, was nonsignificant. Seed cut in May had the lowest yield and germination. This may be due to drying the seed before proper suberization had taken place. Seed cut in May had been dried within two weeks after it had been cut and suberized. Some of the loss in germination and yield was due to mold growth on the seedpieces. At the time of planting, mold growth was noted on several treatments that later proved to have low germination.

P. I. table 10. Effect of dates-of-seed-cutting on yield^{1/} of U. S. No. 1 tubers per acre of 4 varieties planted at Presque Isle, Maine, 1958.

Variety	Seed cutting dates									
	February		March		April		May		Means	
	U.S.No.1	Germina- tion	U.S.No.1	Germina- tion	U.S.No.1	Germina- tion	U.S.No.1	Germina- tion	U.S.No.1	Germina- tion
	Cwts	Pct	Cwts	Pct	Cwts	Pct	Cwts	Pct	Cwts	Pct
Kennebec	336	83	319	85	322	81	290	66	317	80
Katahdin	318	89	301	81	311	83	291	74	306	82
Sebago	289	96	272	90	274	84	263	69	275	85
Irish Cobbler	275	99	235	98	263	97	262	84	259	95
Means	305	92	282	89	292	86	277	73		

^{1/} Difference between 2 variety means at .05 level 17 cwts.

Difference between means of same variety for any 2 dates 31 cwts.

Difference between 2 cutting dates at .05 level 13 cwts.

The data for the effect of dehydration on yield is given in P. I. table 11. Germination and yield was adversely effected by removing water from the seed. Yield was lowered 77 hundred weights per acre by removing 45 percent of the moisture from the seed.

The time between seed cutting and dehydration appears to be critical in effecting yield and germination. In general, the longer the time of suberization the less effect dehydration had on yield and germination. Some type of seed treatment may also be necessary to prevent the growth of mold on the cut and dehydrated seed if maximum yields are to be obtained.

P. I. table 11. Effect of dehydration of seed on yield^{1/} of U. S. No. 1 tubers per acre of 4 varieties planted at Presque Isle, Maine, 1958.

Variety	Percent moisture removed from seed									
	0		15		30		45		Means	
	U. S. No. 1	Germination	U. S. No. 1	Germination	U. S. No. 1	Germination	U. S. No. 1	Germination	U. S. No. 1	Germination
	Cwts	Pct	Cwts	Pct	Cwts	Pct	Cwts	Pct	Cwts	Pct
Kennebec	339	86	342	87	311	79	272	66	317	80
Katahdin	343	96	329	91	289	75	260	65	305	82
Sebago	323	96	303	90	267	84	204	69	275	85
Irish Cobbler	277	99	366	98	258	97	235	84	259	95
Means	320	94	310	92	281	84	243	71		

^{1/} Difference between 2 variety means at .05 level 17 cwts.

Difference between means of same variety for any 2 dehydrations, 18 cwts.

Difference between 2 dehydration means at .05 level 3 cwts.

Scab resistance

A total of 548 seedling selections representing 65 family lines were tested for scab resistance in scab-infested soil on Aroostook Farm. The results are tabulated in P. I. table 12. Most of the selections were from seedling hills selected at Chapman Farm in 1956. Scab injury was not as severe in 1957 as in previous years. Thirty-one percent of the seedling tubers were free from scab and no type-4 pustules were found on the Green Mountain checks. In previous years it has been unusual to find some of the seedling tubers entirely free of scab. The most common surface area covered with scab was 1 to 20 percent (class 1); and the most common pustule type was large, but still superficial (type 2). All of the Green Mountain checks had 21 to 40 percent of the tuber surface covered with large rough pustules.

Each year a number of new selections and varieties are tested for scab resistance in comparison with the susceptible check variety Green Mountain. The results of the scab nursery tests for 1957 are summarized in P. I. table 13. Fertility and maturity data for the climatic conditions in northern Maine are also given in P. I. table 13. Maturity, and to a lesser extent fertility, under different climatic conditions would vary considerably from the figures given. As the incidence of scab injury was low this year, only a few selections exhibited a high degree of scab susceptibility. B 3172-13, B 3871-11, and B 3897-4 were the most susceptible seedlings, and were the only selections with type 3 scab. The remaining selections had type 1 or type 2 scab and may be considered to have some scab resistance.

P. I. table 12. Summary of the data observed from the scab tests on Aroostook Farm, Presque Isle, Maine, 1957.

Material tested	Total number	<u>1/</u> Surface area covered				<u>2/</u> Type pustule			
		T	1	2	3 4	1	2	3	4
Seedling varieties	548	389	137	22	0 0	113	190	69	4
Gr. Mountain check	548			548				548	

1/ Surface area covered

T = less than 1%

1 = 1 to 20%

2 = 21 to 40%

3 = 41 to 60%

4 = 61 to 80%

2/ Type of pustule

1 = small, superficial

2 = large, but still superficial

3 = large rough pustules

4 = large rough pustules, deeply pitted

P. I. table 13. Scab nursery test planted in infested soil on Aroostook Farm, Presque Isle, Maine, 1957.

Seedling or variety	Replication 1				Replication 2				Fertility ^{2/}	Maturity ^{3/}
	Seedling		Check ^{1/}		Seedling		Check			
	Ar	Ty	Ar	Ty	Ar	Ty	Ar	Ty		
B 2162-36	1	1	2	3	1	1	2	3	N	M
B 2368-13	1	2	2	3	1	2	2	3	N	M
B 2874-4	T	2	2	3	T	1	2	3	N	M
B 2922-26	T	1	2	3	T	1	2	3	N	M
B 3114-52	2	2	2	3	1	2	2	3	G	M
B 3172-13	1	3	2	3	1	3	2	3	N	E
B 3309-2	1	1	2	3	T	2	2	3	N	L
B 3309-4	1	1	2	3	T	1	2	3	M	E
B 3319-30	3	2	2	3	1	2	2	3	S	M
B 3453-2	1	1	2	3	T	1	2	3	N	M
B 3454-5	1	2	2	3	T	2	2	3	N	M
B 3454-14	2	1	2	3	1	1	2	3	N	E
B 3832-20	1	2	2	3	T	2	2	3	N	M
B 3849-10	T	2	2	3	1	2	2	3	N	L
B 3857-11	T	1	2	3	1	1	2	3	N	M
B 3871-6	1	1	2	3	T	2	2	3	N	M
B 3871-11	1	3	2	3	T	2	2	3	N	M
B 3876-25	1	1	2	3	T	2	2	3	N	E
B 3897-4	1	3	2	3	1	3	2	3	N	L
B 3897-9	T	2	2	3	T	2	2	3	N	M
B 3897-11	1	2	2	3	T	2	2	3	N	M
B 3903-1	T	1	2	3	1	2	2	3	N	E
B 3964-1	1	1	2	3	T	1	2	3	N	M
La 1859	1	2	2	3	1	2	2	3	G	M
Cherokee	T	1	2	3	1	2	2	3	N	M

1/ See footnote to P. I. table 12 for class ratings.

2/ Fertility in the field, based on relative number of seedballs per plant.
N = zero fertility, S = some fertility, M = medium fertility, G = good fertility.

3/ Maturity: E = early-season maturity, M = mid-season maturity, L = late-season maturity.

The segregation of scab resistance in 12 selfed family lines was determined in 1957 on the Aroostook Farm scab plot. The data for this test is tabulated in P. I. table 14. The progenies of X 627-126 (B 1513) and Menominee (B 1511) selfed, showed the highest degree of scab resistance. All the selfed lines exhibited scab resistance and were superior to the Green Mountain checks which were all rated 2 for surface area and 3 for pustule type.

P. I. table 14. Summary of the segregation of 12 selfed lines for scab resistance, Aroostook Farm, Presque Isle, Maine, 1957.

Progeny number	Pedigree number	Total no. hills	No. scab- free hills	Surface area covered ^{1/}				Type pustule ^{2/}			
				T	1	2	3	1	2	3	4
B 1511	Menominee selfed	20		18	2			19	1		
B 1512	Sebago	74		18	30	13	3	10	38	26	
B 1513	X 627-126	68		67	1			66	2		
B 1515	B 929-32	53		34	16	3		31	15	7	
B 1517	B 2922-26	122		34	73	13	2	34	55	33	
B 1519	B 3139-24	133		50	56	21	6	64	67	2	
B 1520	B 3309-8	75		24	36	15		13	23	38	1
B 1521	B 3403-10	129		63	46	20		56	53	20	
B 1522	B 3556-12	59		55	4			29	22	8	
B 1523	B 3672-3	143		95	41	7		72	58	13	
B 1524	B 3720-9	122		63	46	13		65	49	8	
B 1527	Ac 26031	36		26	8	2		28	7	1	

^{1/}, ^{2/}, see footnote P. I. table 12 for class ratings.

A correlation between scab resistance and red color was made on 75 tubers of the segregating progeny of B 3309-8 selfed. The results are tabulated in P. I. table 15. The four color classes, light red, medium red, dark red and purple red were given the arbitrary numbers 1, 2, 3, and 4 for the purpose of analysis. The pustule type numbers 1 through 4 were also used in the analysis. A non-significant negative correlation of minus .05 was found between scab pustule type and red color. Apparently, red color and scab pustule type segregate as independent characters in this family line.

Variety Test in Wilt-Infected Soil

A. E. Schark, R. V. Akeley, and R. Bonde

Fifteen seedling or named varieties were tested for wilt resistance on infested soil at Caribou, Maine, in 1957. P. I. table 16 lists the varieties according to yield in hundred weights and bushels per acre. B 2187-25, a leaf roll resistant selection, had the lowest incidence, 9 percent, of wilt infection. However, it ranked next to last in yield. Both the solids content and percent of U. S. No. 1 tubers of B 2187-25 were satisfactory.

P. I. table 15. Segregation of B 3309-8 selfed for scab resistance and red color, Aroostook Farm, Presque Isle, Maine, 1957.

Total progeny	Scab resistance							
	Surface area covered ^{1/}				Type pustule ^{2/}			
	T	1	2	3	1	2	3	4
No.	No.	No.	No.	No.	No.	No.	No.	No.
75	24	36	15		13	23	38	1

Red color segregation				
Light red	Medium red	Dark red	Purple red	
No.	No.	No.	No.	
75	29	27	13	6

Correlation coefficient between pustule type and red color = .05 with 73 degrees of freedom.

^{1/}, ^{2/}, See footnote P. I. table 12 for class ratings.

B 3397-17 ranked second in wilt resistance with 11 hills infected. It ranked tenth in yield, an undesirable characteristic, but was relatively high in solids content. The seedling variety 792-88 had less than 10 percent of wilt-infected hills in 1954, 1955, and 1956, and was one of the 3 most wilt-resistant seedlings those years. In 1957, 792-88 ranked eleventh in wilt resistance with 30 percent of wilt-infected hills. The North Carolina selection 50B9-8 was the highest yielding variety in the test, yet it was extremely wilt susceptible. Only 1 other seedling, La 1859, had more wilt-infected hills than 50B9-8. La 1859 and 50B9-8 were last and next to last, respectively, in percent of solids.

As in previous years there was little or no correlation between yield and disease incidence. The highest yielding seedling, 50B9-8, was also next to the highest in percent of wilt-infected hills. In contrast, La 1859, the most wilt-susceptible seedling was also the lowest yielding seedling.

Verticillium Wilt Resistance

A. E. Schark, R. V. Akeley, and R. Bonde

P. I. table 17 summarizes the results obtained in the 1957 verticillium wilt test. Approximately 339 selections representing 45 family lines were grown on the Ashby Farm at Caribou, Maine. The level of infection as measured by the check variety Cherokee was at least as great this year as it was in previous years. For the past 3 years, Cherokee has been 100 percent infected with verticillium wilt. Three check varieties, Cherokee, Houma, and Katahdin were planted at intervals of 25 rows throughout the plot. Cherokee is susceptible to wilt and Houma and Katahdin are moderately resistant to the organism. Only 3 (6 percent) of the 45 family lines were free of wilt infection this year, and 9 (20 percent) were 100 percent infected.

P. I. table 16. Reaction to verticillium wilt as reflected in yields and percent solids of 15 varieties of potato grown in wilt-infested soil at Caribou, Maine, 1957.

Variety	Hills	Yield per acre			Solids
	infected	U. S. No. 1			
	with wilt				
	Pct.	Cwts.	Bu.	Pct.	Pct.
50B9-8	43	583	972	97	17.7
Katahdin	21	405	675	97	18.8
Menominee	24	372	620	98	18.4
Boone	23	371	619	98	18.1
792-88	30	370	618	92	20.0
B 751-119	22	362	603	97	19.7
B 859-10	27	361	602	95	19.4
Houma	20	361	602	96	19.3
41956	18	361	602	91	20.5
B 3397-17	11	347	578	95	19.4
Tawa	43	334	556	97	18.8
49B13-2	24	298	496	97	18.2
B 3095-18	33	292	487	97	18.4
B 2187-25	9	291	486	95	18.6
La 1859	47	262	437	94	17.4
L.S.D. .05 level		53	88		0.8

P. I. table 17. Verticillium-wilt-resistance test, 5-hill plots, on the Ashby Farm, Caribou, Maine, 1957.

Material tested	Selec- tions tested	Selections		Reading based on total hills		
		infected		Total	Infected	
		No.	Pct.	No.	No.	Pct.
Forty-five family lines	339	224	66	1695	523	31
Cherokee check	9	9	100	45	35	78
Houma "	9	8	89	45	19	42
Katahdin "	9	5	56	45	8	18

Late Blight Injury as Reflected in Yields and Percentage of Solids

For the past few years, a number of varieties have been exposed, in a randomized split-block design, to a late blight epiphytotic on the Aroostook Farm. In 1957, 3 highly-resistant varieties, Kennebec, Merrimack, and Saco; and two moderately-resistant varieties, Sebago and Menominee, were compared with the susceptible variety Katahdin. The field plot was sprayed at 7-day intervals with the treatments given in P. I. table 18. As mentioned earlier in this report, ideal conditions existed in northern Maine in 1957 for the increase and spread of late blight. Each treatment was isolated from the adjacent plot by two rows of the susceptible variety Teton. On July 12 the Teton guard rows were inoculated with late blight and by August 11 the vines were completely dead from the resulting epiphytotic.

The effect of late blight on yield can best be seen by examining the means of the susceptible variety Katahdin. With no spray protection, Katahdin yielded 33 hundred weights per acre; with dithane alone, it yielded 212 hundred weights per acre, a highly significant difference. Apparently the damage from late blight in 1957 was much greater than aphid damage as there were no significant differences between the water and DDT treatments for the highly resistant variety Merrimack. Nor were there significant differences between the dithane, and dithane plus DDT treatments. The dithane plus DDT treatment had very little influence on yield over the dithane alone treatment. Significantly different percentages of dry matter were found for the moderately resistant varieties Sebago and Menominee, and for the 3 highly resistant varieties Kennebec, Merrimack and Saco. Controlling the spread of late blight with dithane keeps the foliage alive longer and in this instance may be responsible for more mature tubers, higher in total solids, than those which were killed by late blight earlier in the season.

Varietal Reaction to Net Necrosis and Stem End Browning

Ten varieties were tested for resistance to net necrosis as measured by yield and percentage of infected tubers (P. I. table 19). Alternate rows in the test were planted with tubers from leaf-roll-infected plants. All the plants in this test were inoculated on July 11 with aphids, which had been fed on leaf-roll-infected Katahdin plants.

P. I. table 19. Yields^{1/} of 10 potato varieties exposed to leaf roll in the field to test for net necrosis resistance.

Variety	U. S. No. 1 yield per acre			Total tubers examined	Net necrosis	Stem end browning
	Cwts.	Bu.	Pct.	No.	Pct.	Pct.
927-3	279	465	80.7	478	0.0	1.2
Katahdin	273	455	86.4	553	0.0	6.2
La 1859	269	449	88.6	430	0.0	2.1
49 B 13-2	254	423	87.7	401	0.0	0.7
Green Mountain	246	410	88.6	449	1.8	0.8
B 2859-5	242	403	79.1	473	0.0	28.7
B 73-3	224	374	90.8	387	0.8	4.4
Sebago	221	369	68.4	525	0.0	15.9
B 137-5	205	341	79.5	339	0.0	1.6
B 75-4	80	134	95.3	193	0.0	0.7
L.S.D. .05 level	45	75				

^{1/} Yield of U. S. No. 1 potatoes, 1 7/8 inches minimum size, 4 inches maximum size. Yield in hundred weights and bushels per acre.

The spread of leaf roll in the field was not satisfactory when the amount of tuber infection is considered. Green Mountain, the susceptible check, had only 1.8 percent infection showing in its tubers. The stem-end-browning symptoms were also recorded. All varieties showed a trace or more of stem end browning. The 2 most susceptible varieties based on tuber symptoms were B 2859-5 with 28.7 percent and Sebago with 15.9 percent.

Golden Nematode Resistance
R. V. Akeley and L. C. Peterson

The results of the study of resistance to golden nematode are presented in P. I. table 20. In 1956, 4,120 seedlings from 17 family lines bred for nematode resistance were increased and 106 selections made at the Chapman Farm, Maine. These 106 selections tested in 1957 on Long Island by L. C. Peterson and co-workers, originated from backcrosses to S. tuberosum. The original source of resistance was S. andigenum. The number of selections (2½ percent) made is low due to the many undesirable characters carried over from the original source of resistance.

Several valuable parents resistant to golden nematode as a result of this test were also found to have other disease-resistant factors when tested in Maine. Golden nematode-resistant seedlings, B 4158-1, B 4158-5, B 4159-5 and B 4159-8, had white tubers, medium maturity, were immune from latent mosaic, and had resistance to late blight, scab, and verticillium wilt. Several other resistant seedlings were also saved for parents since they too had valuable combinations of multiple-disease resistance.

P. I. table 20. Golden-nematode-resistance tests. Selections made in Maine, 1956, and tested on Long Island in 1957^{1/}

Pedigree number	Parentage	Increase, Me., 1956		N. Y. test, 1957	
		grown	selected	susceptible	resistant ^{2/}
		No.	No.	No.	No.
B 4075	PI 205623 x Cherokee	30	1	0	1
B 4076	" x Katahdin	390	14	10	4
B 4077	PI 205624 x "	296	9	6	3
B 4078	" x Kennebec	58	2	2	0
B 4079	PI 205623 x Merrimack	576	4	7	4
B 4080	PI 205624 x "	233	7	3	4
B 4081	PI 205623 x PI 205624	513	2	1	1
B 4146	Katahdin x 1376-2	332	6	3	3
B 4147	" x 1376-6	154	2	1	1
B 4150	Merrimack x "	53	2	1	1
B 4151	" x 1376-13	188	9	2	7
B 4152	B 24-58 x 1376-2	194	11	7	4
B 4153	" x 1376-6	214	9	5	4
B 4158	B 595-76 x 1376-2	217	8	3	2
B 4159	" x 1376-6	210	9	1	2
B 4161	792-88 x 1376-2	368	1	0	0
B 4162	" x 1376-6	94	3	1	1
Totals		4,120	106	53	42

^{1/} Test was made by L. C. Peterson and co-workers on Long Island, N. Y.

^{2/} 11 selections failed to grow or died before a reading was taken.

Solanum Species and Hybrids

R. W. Buck, Jr.

In 1957, 3 hexaploid species, 10 tetraploid species and 180 clones representing 31 diploid species were grown at Beltsville, Maryland for cytological investigation and a study of crossability. In addition, 20 diploid F₁ progenies, 18 triploid hybrid progenies, 4 tetraploid progenies, 13 diploid F₂ progenies and 7 backcross progenies were grown for cytological investigations.

Seed of 17 diploid species and 26 diploid hybrids were germinated on colchicine agar in an attempt to produce artificial tetraploids. Tetraploid plants were obtained in 25 of the progenies.

During 1956 and 1957, pollinations of artificial tetraploids were made. Of 91 plants selfed, 28 produced viable seed. Of 75 plants pollinated with pollen from cultivated varieties 21 produced viable seed. Most diploid species and hybrids are self-incompatible. Doubling the number of chromosomes overcomes self-incompatibility in many instances.

Seed was obtained from 118 combinations of diploid species. F₂ seed was obtained from 12 diploid F₁ progenies; and F₃ seed, from 6 F₂ progenies.

Late Blight Resistance

R. W. Buck, Jr. and Muriel O'Brien

Parental material used in the breeding program at Beltsville, Md., in 1957 and known to possess genes for immunity from one or more races of P. infestans were screened to determine their genotype. Detached leaves were inoculated with 5 specialized races, 123, 124, 134, 234, and 1234, of P. infestans. The varieties and seedlings and their genotypes are listed in P. I. table 21.

P. I. table 21. Genotype of varieties and seedlings possessing immunity from certain races of P. infestans used as parents at Beltsville, Md., in 1957.

Variety	Genotype	Variety	Genotype	Variety	Genotype
Kennebec	R ₁	B 3309-4	R ₁	Ac 25974	R ₁ R ₂
Merrimack	R ₁	B 3309-8	R ₁	WV 2-7	R ₁ R ₃
Plymouth	R ₁	B 3427-7	R ₁	WV 14-17	R ₁ R ₃
Saco	R ₁	B 3428-20	R ₁	Ac 26031	R ₁ R ₃
Tawa	R ₁	B 3428-41	R ₁	B 3097-82	R ₁ R ₃
X 96-28	R ₁	B 3556-12	R ₁	B 3692-4	R ₁ R ₃
X 96-56	R ₁	B 3599-11	R ₁	B 3696-13	R ₁ R ₃
B 355-24	R ₁	B 3604-19	R ₁	B 3947-2	R ₁ R ₃
B 595-76	R ₁	B 3626-13	R ₁	B 3964-1	R ₁ R ₃
B 606-3	R ₁	B 3646-11	R ₁	Ac 25976	R ₁ R ₃
B 606-37	R ₁	B 3652-8	R ₁	Ac 25977	R ₃ R ₄
B 926-9	R ₁	B 3718-WV4	R ₁	B 3673-WV2	R ₁ R ₂ R ₃
B 929-6	R ₁	B 3813-30	R ₁	B 922-3	R ₁ R ₂ R ₄
B 929-32	R ₁	B 3817-53	R ₁	B 922-6	R ₁ R ₂ R ₄
B 991-14	R ₁	B 3832-7	R ₁	WV 13-10	R ₁ R ₃ R ₄
B 3114-6	R ₁	WV 2-4	R ₃	Ac 26033	R ₁ R ₃ R ₄
B 3114-67	R ₁	B 3719-1	R ₃	B 922-9	R ₁ R ₃ R ₄
B 3139-24	R ₁	Ac 25972	R ₃	B 3990-1	R ₁ R ₃ R ₄

During August 1957, 12,906 seedlings from 53 crosses were inoculated with zoospores of race 0 of P. infestans. One or both parents were immune from one or more of the races of P. infestans. The data from this test are summarized in P. I. table 22. Of the 12,906 seedlings inoculated, 10,476 or 81.2 percent, survived.

P. I. table 22. Summary of data obtained from inoculation of seedlings with race 0 of P. infestans.

	Seedlings inoculated	Seedlings infected		Seedlings surviving	
	No.	No.	Pct.	No.	Pct.
53 crosses	12,906	2,430	18.8	10,476	81.2

Scab-Screening Test. Beltsville, 1957
G. V. C. Houghland, R. V. Akeley, and R. E. Webb

A scab-screening test was conducted at Beltsville, Md., in 1957. The purpose of this test was to determine the reaction of certain varieties and seedlings to an induced scab infestation and incidentally to compare their relative yielding ability for local information.

Procedure

The field used was the same one used previously for scab eradication studies. It had been inoculated in September, 1954, according to the method of Houghland and Cash (1) and the infestation was known to be uniformly distributed from the results of previous tests. In order to avoid any possible carry-over effects from previous treatments, the rows of this test were laid out at right angles to the previous row direction.

A 5-10-5 fertilizer mixture was applied in bands at 1,800 pounds per acre with a one-row potato planter when the rows were opened. The seedpieces were dropped by hand at 12-inch intervals with 50 hills comprising a single-row plot. These were 5 replications of each variety or seedling and these were arranged in randomized blocks. When required, the crop was sprayed with D.D.T. for insect control and no fungicide was needed.

The field was planted on April 22 and harvested on August 14. After harvest, the potatoes were sorted into two scab classes and weighed; 0 - 25 percent of the tuber surface, and 25 - 100 percent. Most of the scab infection was of the deep-pitted type.

(1) Houghland, G. V. C. and Cash, Lillian C., 1954. The use of vermiculite in providing scab inoculation for potatoes. Pl. Dis. Reptr. 38:460-461.

Results

The results are presented in P. I. table 23. Among the named varieties, Plymouth was the most outstanding for scab resistance, producing 95 percent marketable potatoes. However, Cherokee produced the highest total yield, 76.7 percent of which was marketable. It was observed that Cherokee produced an unusually large tuber set and matured two weeks earlier than all other varieties, except Plymouth which also matured early. None of the numbered seedlings were particularly outstanding in scab resistance in this test.

The value for the coefficient of variation for total yields is considered normal for a variety test; however, the high coefficient for marketable potatoes undoubtedly is due to the variable reaction to scab infection on the individual tubers that normally occurs. The F value in each case exceeded the 1 percent point.

P. I. table 23. Results of scab screening test. Beltsville, Md., 1957.

Variety or seedling	Average total yield	Marketable		Scabby
		Cwt.	Pct.	Pct.
Delus	177.1	22.1	12.5	87.5
Merrimack	168.6	85.8	50.9	49.1
Saco	208.6	26.2	12.6	87.4
Boone	181.8	83.4	45.9	54.1
Teton	199.9	37.8	18.9	81.1
Pungo	207.3	85.8	41.4	58.6
Plymouth	165.8	141.2	95.2	4.8
Cherokee	223.8	171.6	76.7	23.3
Kennebec	198.7	43.7	22.0	78.0
Katahdin	207.3	66.1	31.9	68.1
Red Pontiac	219.9	23.7	10.8	89.2
B 2368-4	207.3	58.1	28.0	72.0
B 3299-13	168.3	43.1	25.6	74.4
B 595-76	159.7	77.5	48.5	51.5
B 75-4	136.1	38.5	28.3	71.7
B 75-3	140.6	17.2	12.2	87.8
B 605-10	176.4	102.1	57.9	42.1
L. S. D. .05	32.2	36.7		
L. S. D. .01	42.8	48.9		
C. V. (percent)	13.8	44.0		

P. I. table 18. Reaction of 6 varieties to late blight as reflected in yields per acre and percentage solids^{1/}, Aroostook Farm, Presque Isle, Maine, 1957.

Variety	Treatments, yield ^{2/} and percentage solids ^{3/}														
	Water			DDT			Dithane			DDT + Dithane			Means		
	U.S.No.1			U.S.No.1			U.S.No.1			U.S.No.1			U.S. No.1		
	Cwts	Bu.	Pct.	Cwts	Bu.	Pct.	Cwts	Bu.	Pct.	Cwts	Bu.	Pct.	Cwts	Pct.	
Katahdin	33	55	16.1	39	65	15.2	212	353	20.2	232	387	20.2	13	17.9	
Sebago	117	195	17.8	90	150	17.5	232	387	20.3	245	409	20.2	171	19.0	
Menominee	148	246	16.5	138	230	17.1	290	483	19.0	312	520	20.4	222	18.3	
Kennebec	350	583	22.7	400	667	21.8	363	605	22.3	351	585	22.4	366	22.3	
Merrimack	286	476	22.3	286	477	22.3	259	431	22.5	262	437	21.7	273	22.2	
Saco	343	572	23.5	367	611	23.5	352	586	23.4	364	607	22.7	357	23.3	
Means	213	355	19.8	220	367	19.6	285	474	21.3	294	491	21.3			

^{1/} Based on specific gravity of tubers

^{2/} Difference between 2 variety means at .05 level, 11 cwts and 19 bushels, difference between means of same variety for any 2 treatments, 37 cwts and 62 bushels.

^{3/} Difference between 2 variety means at .05 level, 2.2 percent, difference between means of same variety for any 2 treatments, 1.2 percent.

Potato Disease Investigations
R. E. Webb, E. S. Schultz, Muriel O'Brien, R. V. Akeley
R. W. Buck, Jr., and Allen Schark
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Late Blight Resistance

Five hundred and twenty-nine selections were screened for relative resistance to late blight in the greenhouse and under field conditions. Webb table 1 summarizes the results of the field test. Two hundred and eighty-eight selections were immune from race 0; 5 showed high field resistance; 33 moderate and 71 slightly greater resistance than the susceptible control, Green Mountain.

Isolates of late blight samples from the late-blight screening plot at weekly intervals did not reveal the presence of races other than the 11 previously identified.

Virus X Resistance

Webb table 2 shows the reaction of potato selections screened for resistance to virus X in 1957. A total of 211 selections were mechanically inoculated with virulent strain of the virus. Those resisting infection by mechanical means were grafted with virus-X-infected scions of Green Mountain to confirm the resistance of each selection. Eighty-one selections proved highly resistant to virus X.

Attempts to recover virus X from roots, stems and leaves of graft-inoculated plants of potato seedling 41956 (X-immune) grown at temperatures of 16, 20, 24 and 28°C, have proven negative in 2 tests. In each test 3 plants were grafted with a mild, moderate and virulent strain of virus X and held at each temperature for 35 days. The indexing host was Gomphrena globosa.

One hundred and eighty clones representing 61 *Solanum* species and 71 species hybrids were evaluated for resistance to virus X. Plants of clones in the following species did not become infected by mechanical inoculation; S. acaule 4, S. andigenum 5, S. cardiophyllum 1, S. rybinii 2, S. stoloniferum 1, S. subtilius 1, S. verrucosum 1 and species hybrids 8.

Virus Y Resistance

One hundred new selections were entered in the virus Y tests for 1957. Webb table 3 summarizes the results. Of the 131 selections inoculated with viruliferous aphids, Myzus persicae (Sulz.), for the second successive year, only 37 did not develop symptoms. The progeny of B 2067-52 selfed showed the greatest resistance to infection. Approximately 30 percent of the selections from this progeny failed to become infected the second year.

Two hundred and sixty-nine clones representing 60 Solanum species and 58 species hybrids were evaluated by mechanical and aphid inoculation for resistance to virus Y. Twenty clones and 1 species hybrid resisted infection by both methods.

Webb table 1. Reaction of selections to late blight in 1957.

Pedigree	Parentage	No. clones inoculated	Clones in disease class ^{1/}				
			0	1	2	3	4
B 4075	PI 205623 x Cherokee	1					1
B 4078	PI 205624 x Kennebec	2	1		1		
B 4079	PI 205623 x Merrimack	11	5	1	2	2	1
B 4080	PI 205624 x Merrimack	7	2		1	1	3
B 4082	Cherokee x B 81-40	5	1			1	3
B 4083	Chippewa x Cherokee	5	4			1	
B 4084	Chippewa x B 81-40	9				2	7
B 4085	Chippewa x 528-170	7			2	3	2
B 4089	R.N. Yorker x B 2834-3	12	5			3	4
B 4093	Menominee x B 881-12	22				7	15
B 4097	Saco x 47156	3	1			1	1
B 4098	B 595-76 x B 2834-3	5	4				1
B 4099	" x 47156	22	8			3	11
B 4106	B 922-3 x B 1172-16	5	2		1	1	1
B 4113	B 1395-57 x B 2834-3	5				1	4
B 4128	B 2962-6 x B 2969-15	17	13	1			3
B 4130	B 3014-10 x B 929-32	17	10	1	1		5
B 4132	B 3097-82 x Katahdin	29	27				2
B 4134	B 3186-6 x B 3139-24	55	23			7	25
B 4135	B 3139-24 x Cherokee	22	11		4	4	3
B 4136	B 3139-24 x B 355-24	9	5			2	2
B 4150	Merrimack x 1376-6	2				2	
B 4151	" x 1376-13	9	2		1	1	5
B 4156	96-28 x B 355-24	13	9	1		1	2
B 4157	B 355-24 x B 919-15	5	3		1	1	
B 4158	B 595-76 x 1376-2	8	8				
B 4159	" x 1376-6	9	9				
B 4160	" x B 3508-8	13	11				2
B 4165	B 929-6 x B 355-24	3	3				
B 4166	B 962-3 x "	8	2			3	3
B 4167	B 2837-12 x "	6	6				
B 4168	B 3097-82 x B 2962-6	6	5				1
B 4169	B 3102-3 x B 355-24	3	3				
B 4170	B 3139-24 x B 3202-32	8	1		1	5	
B 4171	B 3195-3 x B 355-24	1	1				
B 4173	B 3201-22 x Ac 25976	1	1				
B 4175	B 3418-15 x B 3410-22	5	3			2	
B 4176	B 3508-8 x Menominee	9	4			2	3
B 4177	" x B 355-24	2	2				
B 4179	Ac 25825 x "	4	4	1			
B 4180	B 3516-11 x "	9	9				

continued

Webb table 1 continued.

Pedigree	Parentage	No. Clones Tested	Clones in disease class ^{1/}				
			0	1	2	3	4
B 4189	B 929-6 x Ac 25976	1	1				
B 4190	B 3139-24 x "	1	1				
B 4191	B 3195-3 x "	4	4				
B 4192	B 3401-20 x "	2	2				
B 4193	B 3406-3 x 96-28	1	1				
B 4194	" x Ac 25976	3	3				
B 4195	B 3407-3 x Dyk 5230	1	1				
B 4205	B 2483-55 x Ac 25976	3	3				
B 4207	B 3508-8 x Dyk 5230	2	2				
B 4208	" x Ac 25976	1	1				
B 4209	B 3516-11 x B 355-24	5	5				
B 4211	" x B 929-6	1	1				
B 4212	" x Dyk 5230	4	4				
B 4213	" x B 3410-22	2	2				
B 4214	" x Ac 25976	15	15				
B 4215	3 VW-9 x Ac 25959	5	5				
B 1493	B 24-58 selfed	1					1
B 1494	X 927-3 "	1					1
B 1495	B 929-32 "	5	5				
B 1498	B 3014-10 "	26	19				7
B 1500	B 3508-8 "	3	3				
B 1505	Menominee "	24			7	9	7
B 1506	B 3200-2 "	21			11	6	4
50B9-8		1	1				
OB 2905-1		1	1				

^{1/} Classes

0 = No lesions 2 = 1/2 leaves blighted 4 = All but few leaves blighted
1 = Occasional lesion 3 = 2/3 leaves blighted

Webb table 2. Reaction of selections to virus X in 1957.

Pedigree	Parentage	No. clones tested	No. clones Resistant
B 4097	Saco x 47156	3	3
B 4098	B 595-76 x B 2843-3	6	4
B 4099	" x 47156	1	1
B 4100	792-88 x B 2359-84	17	4
B 4101	" x B 2962-6	9	7
B 4105	792-94 x B 3139-24	22	9
B 4108	B 982-11 x B 3186-6	10	2
B 4128	B 2962-6 x B 2969-15	17	9
B 4137	B 3209-35 x B 2962-6	2	0
B 4143	41956 x Earlane	3	1
B 4156	96-28 x B 355-24	12	0
B 4158	B 595-76 x 1376-2	8	7
B 4159	" x 1376-6	9	6
B 4160	" x B 3508-8	12	6

continued

Webb table 2 continued.

Pedigree	Parentage	No. clones tested	No. clones Resistant
B 4161	792-88 x 1376-2	1	1
B 4162	" x 1376-6	3	2
B 4165	B 929-6 x B 355-24	3	0
B 4168	B 3097-82 x B 2962-6	6	6
B 4189	B 929-6 x Ac 25976	1	0
B 4216	41956 x A 163-88	5	2
B 1501	41956 selfed	38	10
B 1506	B 3200-2 selfed	21	0
50B9-8		1	1
OB 2905		1	0

Inoculations: Mechanical using virulent strain of virus x. Resistant ones were then grafted with scions of Green Mountain for aerial tuber formation.

Webb table 3. Reaction of potato selections to virus Y in 1957.

Pedigree	Parentage	No. clones tested	No. clones resistant
B 4082	Cherokee x B 81-40	5	0
B 4083	Chippewa x Cherokee	5	0
B 4084	" x B 81-40	9	3
B 4085	" x 528-170	7	2
B 4097	Saco x 47156	3	0
B 4102	792-94 x Katahdin	17	3
B 4106	B 922-3 x B 1172-16	5	3
B 4108	B 982-11 x B 3186-6	10	10
B 4109	B 982-23 x B 3186-6	9	7
B 4110	B 982-11 x B 3209-35	10	7
B 4119	B 2368-4 x B 3186-6	7	5
B 4137	B 3209-35 x B 2962-6	2	2
B 4138	" x B 3186-6	9	8
50B9-8		1	1
OB 2905-1		1	0

Virus A Resistance

Webb table 4 shows the reaction of potato selections screened for field-immunity from potato virus A. Each selection was grafted in triplicate to virus-A-infected plants of potato seedling 41956 to determine the top-necrotic-reactors (graft-hypersensitive). Selections susceptible by grafting were infested with virus A-infective aphids Myzus persicae (Sulz.) to determine those immune from infection by aphid inoculation. Forty-five selections proved to be graft hypersensitive and 10 were immune from aphid infection.

Webb table 4. Reaction of potato selections to virus A, 1956 - 1957, Beltsville.

1956 Stake No.	Pedigree	Parentage	Reaction ^{1/} Graft	Aphids
1053	B 3800-1	B 24-58 x Katahdin	-	-
1054	B 3800-2	B 24-58 x Katahdin	+	+
1084	B 3801-11	B 606-37 x B 24-58	-	
1191	B 3807-12	B 2944-65 x B 2067-52	+	+
1294	B 3813-30	B 24-58 x 3 VW-9	+	+
1313	B 3814-12	B 24-58 x B 2067-52	-	
1324	B 3814-33	B 24-58 x B 2067-52	+	+
1353	B 3817-23	B 779-1 x B 24-58	+	-
1383	B 3817-53	B 779-1 x B 24-58	+	-
1413	B 3818-30	792-88 x "		-
1442	B 3819-3	792-94 x "	+	+
1456	B 3819-17	" x "	-	
1598	B 3829-16	Houma x Katahdin	+	+
1605	B 3832-7	B 294-38 x B 3139-24	+	-
1609	-11	" x "	+	+
1618	-20	" x "	-	
1644	B 3833-20	" x B 2209-25	-	
1648	-24	" x "	+	+
1699	B 3834-44	ND 457-1 x B 294-38	+	-
1712	B 3835-3	" x B 2359-84	-	
1722	-13	" x "	-	
1790	B 3837-11	B 595-76 x B 294-38	-	
1849	B 3849-16	B 2834-3 x B 3186-6	-	
1866	B 3854-6	B 991-14 x Teton	-	
1881	B 3856-5	B 3021-3 x "	-	
1896	B 3857-11	Saranac x B 929-32	-	
2007	B 3869-1	B 355-35 x Teton	-	
2022	B 3871-6	B 595-76 x B 3139-24	+	+
2078	B 3874-14	B 766-55 x Teton	-	
2082	-18	" x "	-	
2092	B 3876-9	B 3097-82 x B 3139-24	+	+
2108	-25	" x "	+	+
2122	B 3884-2	B 2131-3 x Centifolia	+	+
2123	-3	" x "	+	+
2150	B 3897-1	ND 3081-2 R x B 2997-9	+	+
2153	B 3897-4	" x "	-	
2158	-9	" x "	-	
2160	-11	" x "	-	
2165	B 3900-3	B 2331-5 x B 3139-24	-	
2168	B 3903-1	La Soda x B 2368-4	-	
2174	-7	" x "	-	
2179	B 3905-5	792-88 x B 2067-52	-	
2199	B 3907-4	B 1268-46 x Katahdin	+	+
2205	B 3908-6	" x 792-94	-	
2241	B 3913-7	792-94 x B 1268-26		
2309	B 3922-16	792-88 x B 3139-24	+	+

continued

Webb table 4 continued.

1956 Stake No.	Pedigree	Parentage	Reaction ^{1/} Graft	Aphids
2326	B 3925-7	B 982-23 x B 3209-35	-	
2344	B 3937-3	Houma x Liberator	+	+
2430	B 3939-37	Liberator x 47156	+	+
2456	B 3940-13	47156 x Katahdin	+	+
2471	B 3940-28	47156 x Katahdin	-	-
2487	B 3940-44	47156 x Katahdin	+	+
2488	B 3940-45	47156 x Katahdin	+	+
2489	B 3940-46	" x "	-	-
2558	B 3944-10	(1673 x 2201)(182)x Merr.	+	+
2560	-12	" x "	-	-
2562	-14	" x " "	-	-
2577	-29	" x " "	-	-
2578	B 3944-30	1673x 2201 (182) x Merr.	-	-
2582	-34	" x " "	+	-
2583	-35	" x " "	-	-
2587	B 3945-1	1673 x 2201 (85) "	+	+
2595	B 3945-11	" x " "	+	+
2596	-12	" x " "	+	-
2597	-13	" x " "	+	+
2599	B 3947-1	Katahdin x Ac 25976	+	+
2600	"	" x "	-	-
2605	B 3948-5	Earlaine x Ac 25976	-	-
2608	B 3950-1	B 595-76 x Ac 25976	-	-
2611	-3	" x "	+	+
2616	B 3956-1	Ac 25953 x Katahdin	+	+
2621	-6	" "	+	+
2633	B 3958-3	Ac 25953 x B 2938-22	+	-
2641	B 3960-3	" x Ac 25976	+	+
2646	-8	" x "	+	+
2650	B 3962-2	Ac 25955 x B 2938-22		+
2652	B 3964-1	Ac 25966 x B 929-32	-	-
2677	B 3979-1	3 VW-9 x Ac . 25955	+	+
2679	-2	" x "	+	+
2682	B 3980-5	3 VW-9 x Ac. 25976	-	-
2698	B 3983-7	3XE-1xKatahdin	+	+
2717	B 3989-6	B 922-3 x Ac. 25949	+	+
2718	B 3990-1	B 24-58 x Ac. 25949	+	+
2754	B 1454-36	Earlaine selfed	-	-
2759	-41	" "	-	-
2802	B 1457-3	Teton selfed	-	-
2913	B 1466-27	B 2067-52 selfed	-	-
2921	B 1466-35	" "	-	-
2957	B 1467-2	B 2331-5 "	-	-
2963	-8	" "	-	-
2964	-9	" "	-	-
2976	B 1474-1	B 29997-9 "	+	-

continued

Webb table 4 continued.

1956 Stake No.	Pedigree	Parentage	Reaction ^{1/} Graft	Aphids
2998	B 1478-12	47156 Selfed	+	+
3043	" -57	" "	-	-
3045	" -59	" "	+	-
Gr. Mt.			+ (6/6)	+ (11/12)

^{1/} - = Resistant
+ = Susceptible

Verticillium Wilt Resistance Tests

Potato seedlings which had survived the greenhouse test and 1 year in soil heavily infested with Verticillium albo-atrum were replanted in heavily infested soil in 1957. Of 142 selections planted, all plants of 9 developed mild to moderate wilt symptoms and from 10 to 30 percent of the plants of 34 selections developed mild to moderate symptoms of infection. All plants of the susceptible control, Cherokee, were dead by the last week in August.

Two hundred and twenty clones representing 54 *Solanum* species and 57 species hybrids were evaluated for resistance to Verticillium albo-atrum. Seventeen clones showed a high level of resistance to infection with the wilt organism.

Leafroll Resistance

Two hundred and twenty-one clones representing 51 species and 57 species hybrids were evaluated for resistance to infection with the leafroll virus. Strain 3 of the leafroll virus was used as the source of inoculum and the tests were conducted under greenhouse conditions. Twelve clones proved highly resistant to infection under conditions of the tests.

COLORADO

J. L. Weigle, C. W. Frutchey and L. A. Schaal

A yield trial containing 3 varieties and 7 advanced seedlings was planted at Fort Collins this year on fall-plowed corn ground. One hundred pounds of 11-33-0 fertilizer per acre was applied at planting time. The weather in May was unusually cool and wet causing the potatoes to start slow. They also set heavier than normal and did not size up. This resulted in a lower yield of N. S. No. 1's than would be expected (see Weigle table 1). The trial was furrow irrigated whenever necessary. The design used was a randomized complete block with 5 replications. Each plot contained two rows of 25 hills each with the hills spaced approximately 12 inches apart.

Weigle table 1. Yield trial at Fort Collins, Colorado, 1957.

Variety or Seedling No.	Maturity	Tuber Color	Yield *	
			U.S.No.1/A	U.S. No.1
			Cwt.	Pct.
Red Pontiac	L	R	247.4	80.8
C.S. 13178	ML	W	202.4	85.5
Katahdin	L	W	192.8	84.5
C.S. 11918	L	W	168.7	84.1
C.S. 11889	E	W	163.5	89.0
C.S. 13091	M	W	153.9	63.8
C.S. 13222	M	W	153.6	60.7
Tawa	E	W	150.4	73.8
C.S. 11012	E	R	136.5	58.0

* Above 1-7/8" in diameter.

Several new varieties and advanced selections from other states were tested in observation trial. With the exception of Onaway and Canoga, which were discarded for being too rough, this material will be planted in a replicated yield trial next year. The percentages of total solids for these varieties, as well as for the better Colorado seedlings, are shown in table II. These data are lower than normal because of unusual weather conditions. Also in the observation trial were 99 third-year seedlings from the U.S.D.A Station at Greeley. Of these, four were selected for further testing.

In addition to Fort Collins plots, the advanced Colorado seedlings were grown in increase plots at two other locations, the San Luis Valley and Steamboat Springs. These areas are generally free of the insect vectors responsible for the spread of leaf roll. Either indexed tubers or tuber units were planted in these locations. These techniques, combined with frequent roguing, were employed to eliminate the leaf roll and spindle tuber picked up at Fort Collins the previous year. These seedlings, listed in Weigle table 2, should now be reasonably clean and are available in small quantities for testing in other states. A description of this material can be found in the 1956 National Report. They are all round whites with scab resistance, high total solids, and good chipping quality. Two of these seedlings, C.S. 12240 and C.S. 13178, are being considered for release in the near future.

Weigle table 2. Total solids at two locations.

Variety or Seedling No.	Fort Collins	San Luis Valley
	Pct.	Pct.
C.S. 12240	19.2	-
C.S. 13178	19.8	-
C.S. 13222	-	19.5
C.S. 13925	20.0	19.5
C.S. 13928	20.2	22.0
Onaway	17.7	-
Manota	18.6	-
Redbake	20.0	20.2
Rukat	17.0	-
Katahdin	16.8	-
Tawa	17.9	21.0
Antigo	17.0	-
Red Beauty	17.0	-
Nordak	18.9	-
Norland	17.6	-
W-0112	20.0	-
Red McClure	-	22.3

INTER-REGIONAL POTATO INTRODUCTION PROJECT
(Cooperative Project of the 48 States and the Vegetables
and Ornamentals Research Branch, ARS)

R. W. Hougas and R. W. Ross

Solanum stocks were received in 1957 from 7 foreign countries (Argentina, Belgium, Bolivia, Colombia, Costa Rica, Guatemala, and Mexico). Most of these ccessions were received following requests for individual stocks directed to foreign research centers. This is in accordance with the general project policy of requesting, when possible, stocks known to possess characters of potential value in improvement of the commercial potato of this nation.

Good increase of both tubers and seed was obtained in 1957. Almost all of the true seed increase was obtained from greenhouse and screenhouse propagated plants. Greenhouse propagation continues to be the most desirable and effective method for increase of both seed and tubers of many Solanum introductions. The use of improved pollination methods, previously described, have allowed for acceleration and expansion of the true seed increase phases of the program. A search for methods of tuber storage better adapted to the needs of the program have been initiated. Modification of the European method of tuber storage under light appears promising in preliminary trials. A survey of several combinations of temperature and exposure to light is now being conducted.

Herbarium specimens were prepared in duplicate of new introductions grown in the 1957 field. One set of pressed specimens was placed in the herbarium for ready reference and another set will be made available for taxonomic study at other stations. The listing of stocks in the current inventory has been rearranged to conform with recent improved taxonomic classification of the tuber-bearing species of South America.

Selections of 83 introductions, including 15 species, have been screened for their reaction to the virulent 1-2-3-4 race of the late blight fungus, Phytophthora infestans, through cooperative studies of the West Virginia Agricultural Experiment Station and the Scottish Society for Research in Plant Breeding. Twelve introductions were found to be highly resistant or immune to this race of the pathogen. Details are reported in the American Potato Journal 34:273-281, 1957.

Introductions of 101 varieties and hybrids of the common potato were screened for their reaction to the leaf roll virus disease by the Idaho Agricultural Experiment Station. This test was conducted under conditions, as measured by the reaction of control plants, extremely favorable for the disease. Four introductions were found to be highly resistant (P.I.'s 208332, 208336, 214372, 215618) and five introductions (P.I.'s 161695, 195162, 214373, 214374, 222943) were moderately resistant.

The cytogenetic and pathology work program of the cooperative Crops Research Division and Wisconsin Station project have made rapid progress in the evaluation and use of the Solanum introductions. Details of these studies will be found under the reports of this recently established cooperative project.

Five new potato varieties, Excel, Haig, Nordak, Norglean, and Norland were released for commercial production in 1957 by American potato breeders. Each of these varieties have the foreign introduction Busola, from Poland, and Sutton's Flourball, from England, in their pedigrees. Other foreign introductions in the parentage of these new varieties are as follows: (1) the German variety Hindenburg - Excel and Haig, (2) the German variety Jubel - Norland and (3) the Austrian variety Petronius - Excel.

New Solanum introductions from South America will become available in 1958 through the expedition now in the field. The exploration is being made by Dr. D. S. Correll. This is the first time since 1948 that Solanum stocks will become available through American explorations. These new introductions will be increased as rapidly as possible, following release from federal quarantine, at the Potato Introduction Station.

GENETICS AND CYTOGENETICS OF THE TUBER-BEARING SOLANUM SPECIES

R. W. Hougas and S. J. Peloquin

In July, 1956, the United States Department of Agriculture, acting upon a long-standing recommendation of technical workers engaged in potato improvement, initiated a project designed to provide an orderly evaluation of the tuber-bearing Solanum species. This project is cooperative between the Vegetables and Ornamentals Research Branch of U. S. D. A. and the Wisconsin Agricultural Experiment Station. The researches of this project are designed to bridge the gap between the work program of the Inter-Regional Potato Introduction Project and the work programs of the several State and federal investigators, particularly the potato breeders, engaged in potato improvement. The principal areas of investigation in this new project are cytogenetics and pathology.

The primary objective of the cytogenetic program is to provide basic information, techniques and hybrids that will be useful to potato breeders of the nation in developing improved commercial varieties. The transfer of desirable genes from some introductions, to the common potato can be accomplished with relative dispatch and ease. Many desirable genes are found, however, in introductions not readily crossable with the commercial potato, S. tuberosum. The cytogenetic program is giving particular attention to introductions in the latter category. The range of ploidy, from diploids ($2n=24$) to hexaploids ($2n=72$), in the tuber-bearing Solanum species must obviously be taken into consideration in approaching this problem. In this respect, crossability of the common potato, which is a tetraploid, with other selections is being investigated in three broad areas: (1) crossability at the tetraploid level (i.e. matings of the common potato with natural or

induced tetraploids), (2) crossability at levels of ploidy higher than tetraploid (i.e. matings of the common potato with natural pentaploids and hexaploids as well as with induced pentaploids, hexaploids and octaploids), (3) crossability at levels of ploidy lower than tetraploid (i.e. matings of induced diploid selections of the common potato with the wild and cultivated diploid species as well as their interspecific hybrids). Consideration is also being given to techniques for (1) increasing fruit and seed set in difficult crosses, (2) increasing male fertility, (3) overcoming self-incompatability, and (4) culture of interspecific embryos which fail to develop normally.

The findings of this newly-established program in calendar year 1957 are more or less of a preliminary nature as might be anticipated. Progress in two or the general areas outlined above seem worthy of mention however.

A. Crossability of Induced Diploids (i.e. haploids) of the Common Potato with the Wild and Cultivated Diploid *Solanum* Species and their Inter-Specific Hybrids.

The obvious initial step essential to this study is that of obtaining haploid selections ($2n=24$) of *S. tuberosum*. Three approaches were employed in attacking this problem: (1) a search for haploid individuals in natural seedling populations of the common potato, (2) a search for haploids in twins from natural seedling populations of the common potato, and (3) a search for haploids among the progeny obtained from pollinations of *S. tuberosum* selections with pollen of several *Solanum* species.

- a. 28 natural seedling populations of the common potato, involving more than 3,000 seedlings, were grown to the transplant stage ($1\frac{1}{2}$ to $2\frac{1}{2}$ inches) and examined, but no haploids were recognized.
- b. More than 20,000 seeds were germinated on filter paper and examined for twin plants. Eleven pairs of twins were found. None of the plants obtained from the twin seedlings were haploid.
- c. A series of *S. tuberosum* (female) - diploid *Solanum* species (male) matings were made in the summer of 1956 at Sturgeon Bay, Wisconsin. Ten selections of the common potato (Minn 1, Minn 10-5-12, Minn 15-2-10-1-2, Minn 20-20-34, Minn 44-2, Minn 113-1, Minn 113-6, ND 457-1, ND 457-1-35 and Katahdin) were used as pistillate parents in matings with seven diploid selections (*S. phureja* - P.I. 205561, P.I. 225682; *S. simplicifolium* - P.I. 208866; *S. verrucosum* - P.I. 161128; *S. spp* - P.I. 217453; *S. phureja* F_1 - WRF 173.7, WRF 175.4). Fruit set was erratic and fruit development was considerably retarded following these matings. Only a few fruits approached normal development and many dropped when one-fourth normal size or less. Twenty-nine haploid plants ($2n=24$) of *S. tuberosum* were found among 37 seedling families resulting from 6041 pollinations. In 1957, approximately 25,000 pollinations involving matings of this type were made. The seedlings from these matings are being grown and examined for haploid plants. Crossability of the haploids with the *Solanum* species is now being examined. To date, matings with five diploid and one tetraploid species have produced viable seed.

B. Techniques for Increasing Fruit and Seed Set in Difficult Crosses

A search for methods of increasing fruit and seed set in difficult inter-specific matings was initiated. Three hormones (NAA, IAA and 2-4-D) were applied to the base of the ovary or to the pedicel at several pre or post pollination stages. The results were extremely variable. The use of NAA applied at early (2-4 days) post-pollination stages was most effective in fruit retention. Grafting on non-tuber bearing Solanaceous species, such as the common tomato, extended the period of flowering, but no striking effect on fruit and seed set was noted in these trials.

NORTH CENTRAL REGIONAL TRIALS 1957
August E. Kehr, Lind Sanford and Cooperators^{1/}

The year 1957 is the seventh season in which these trials have been conducted and marks the most successful set of trials to date. We have reached not only a peak in the number of cooperators, but also in the number of entries submitted. This year entries were submitted from the U.S.D.A. by R. V. Akeley.

Of the eleven selections included in the trials for 1956, four have been named and released as follows:

<u>Progeny No.</u>	<u>Release Name</u>	<u>Introduced by</u>
N.D. 457-1-10	Nordak	North Dakota
N.D. 457-1-16	Norgleam	North Dakota
N.D. 2906-1	Norland	North Dakota
Neb. 26.44-1	Redbake	Nebraska

Environmental Conditions: The tests were conducted on peat soils in Indiana and Iowa and on mineral soils in the other seven States. Fertilizer applications and spacing between the hills and between the rows are based upon local conditions and soil requirements.

Planting dates varied from March 20th in Missouri to June 19th in Nebraska. Days to harvest are as follows:

	<u>Date Planted</u>	<u>Date Harvested</u>	<u>Total Days to Harvest</u>
Indiana	May 7	Oct. 8	154
Iowa	Apr. 25	Sept. 17	145
Michigan	May 16	Sept. 17	124
Minnesota	May 15	Sept. 5	113
Missouri	March 20	July 18	120
Nebraska	June 19	Sept. 27	100
North Dakota	May 13	Sept. 24	134
Ohio	May 28	Sept. 30	125
Wisconsin	June 10	Sept. 23	105

Yields: In the early group Ag. 56.55 was the most consistent high-yielding selection in the nine locations, with yields superior on the average to both Triumph and Cobbler. In Indiana, Nebraska 82-49-IX gave outstandingly high yields. Yields comparable to Cobbler were obtained with Mich. R 139-9, Neb. 223.48-1X, N.D. 3324-2, and B 605-10.

In the late group no selections were superior to the Red Pontiac check in yielding ability.

^{1/} Indiana, H. T. Erickson; Michigan, N. R. Thompson; Minnesota, F. A. Krantz; Missouri, V. N. Lambeth; Nebraska, H. O. Werner; North Dakota, R. H. Johansen; Ohio, W. N. Brown; Wisconsin, G. H. Rieman; U.S.D.A., R. V. Akeley. Credit for much of the statistical analysis is given to Mr. Lind Sanford, Dept. of Horticulture, Iowa State College.

Maturity: The earliest maturing selections were N.D. 2906-1 (ave.1.7), and N.D. 2274-3 (ave. 2.0). These were both earlier than both early checks (Cobbler - ave. 2.3 and Triumph ave. 2.5).

Percentage Solids: Location had as great an effect on percentage of total solids as varieties as shown below.

	<u>Highest</u>	<u>Lowest</u>	<u>Difference</u>
Range of Varieties	20.6	15.7	4.9
Range of Locations	20.4	15.6	4.8

Varieties reported with the highest total solids at all locations were I 801-10 (20.6), Neb. 82.49-1X (20.2), Wis. X 137.52 (19.7), and Wis. X 143.52 (19.7). These were all higher than the highest check (Cobbler 18.9).

Scab Resistance: The most outstanding variety for overall scab resistance was B 926-9, which was reported with no scab more serious than a 2 type scab. Others with high resistance were I 801-10, Neb. 223.48-1X, N.D. 2906-1, B 605-10, and Wis. X 137.52. Apparently the greatest incidence of scab was found on the muck soils in Indiana and Iowa, although Nebraska also reported severe scab infection.

Overall Merit Ratings: Merit ratings were made by Indiana, Iowa Missouri, Nebraska, North Dakota and Wisconsin as follows:

<u>Selection</u>	<u>Total No.Merit</u> <u>Points</u>	<u>Selection</u>	<u>Total No.Merit</u> <u>Points</u>
N.D. 3324-2	13	B 605-10	6
Ag. 56.55	9	I 801-10	6
Mich. R 139-9	8	I 961-1	5
Neb. 82.49-1X	8	Neb. 223.48-1X	5
B 926-9	8	Wis. 137.52	5
N.D. 2906-1	8	Tawa	4

North Central table 1.

Indiana. Cooperator - H. T. Erickson. Location - Walkerton, Ind. Soil type - Muck. Fertilizer - 1100 lbs/A 5-20-20. Spacing - Hills 12", Rows 36". Date Planted - May 7, 1957. Date Harvested - October 8, 1957.

REMARKS - June was wet with 5.1 inches. It turned dry in late summer but the plots were not irrigated. June was relatively cool but July was warm with an average high of 86.7° and low of 60.7°. Late summer was warm. Dithane, copper sulfate, and fixed copper fungicides, Dieltrin, DDT and Heptachlor for insecticides was applied at a week to ten-day intervals. The vines were killed by frost about two weeks before harvest and mowed shortly thereafter. Specific gravity was determined from an eight-pound sample using a potato hydrometer.

Iowa. Cooperator - A. E. Kehr. Location - Clear Lake, Iowa. Soil type - Neutral peat. Fertilizer - 2600 lbs. 0-9-27. Spacing - Hills 12", Rows 36". Date Planted - April 25, 1957. Date Harvested - September 17, 1957.

REMARKS - Adequate rainfall throughout the growing season, temperature very favorable for potatoes. A total of 13 inches of rain fell between 5-13 and 8-19, all evenly distributed over the growing season. There were 14 days throughout the summer with maximum temperature above 90°F. The highest minimum temperature was 68° for the period 7-15 to 7-22. Sprayed every five days with dithane and DDT beginning May 20th. Bordeaux sprays replaced dithane after July 4th. Vines were killed with sodium arsenite spray on September 7. Cool weather after application prevented a good killing of leaves. Specific gravity determinations were made with a special scale on 25 tuber samples weighing 15-20 pounds each, from each replication.

Michigan. Cooperator - N. R. Thompson. Location - Lake City, Michigan. Soil Type - Iosco sandy loam. Fertilizer - 1000 lbs. 5-20-20. Spacing - Hills 11", Rows 36". Date Planted - May 16, 1957. Date Harvested - September 17, 1957.

REMARKS - Rainfall through May and June was normal and well distributed. Seven inches of rain on July 8 and over one inch on July 11 caused some water damage. This was followed by extremely dry weather. Potatoes were irrigated three times. Potatoes were sprayed at weekly intervals throughout the season. Parathion was used to control aphids when needed. Most selections matured unusually early for the Lake City area. Fusarium wilt was quite prevalent, which along with limited rainfall during the latter part of July and August, accounted for the early maturity. Maturity and general merit ratings were omitted because of the abnormal maturity.

Minnesota. Cooperator - F. A. Krantz. Location - Duluth, Minnesota. Soil Type - Silt loam. Fertilizer - 600 lbs. 8-16-16. Spacing-Hills 18", Rows 42". Date Planted - May 15, 1957. Date Harvested - September 5, 1957.

REMARKS - There was excessive rainfall through July followed by higher than normal temperatures with no rain during August. This caused the premature death to all entries except I 801-10 and B 595-76. U.S. No. 1 yields were not taken because few tubers attained sufficient size. Specific gravity determinations were made by the water displacement method. One specific gravity determination was made of each entry.

Missouri. Cooperator - V. N. Lambeth. Location - Franklin, Missouri. Soil Type - Menfro silt loam. Fertilizer - Plowed down 25-112-90, disk in 25-112-90, banded 200 lbs. Side dressed 40 lbs. after tuber set 12-12-12. Spacing - Hills 12", Rows 40". Date Planted - March 20, 1957. Date Harvested - July 18, 1957.

REMARKS - Unseasonably low temperatures and wet soil immediately after planting and lingering into April delayed sprouting and emergence - contributed to comparatively low yields. Deficiency in soil moisture at time of tuber set and rapid tuber sizing. Applied 1½ inches of water each time. Malathion was applied soon after emergence for potato aphids. Methoxychlor -

zineb was applied at 10-day to two-week intervals through May and June. No chemical vine killers were used. The tops were removed two days before harvest with a rotary mower. Specific gravity determinations were made on stock in storage after field heat was taken out. Four eight-pound samples were used one from each replication.

Nebraska. Cooperator - H. O. Werner. Location - Alliance, Nebraska. Soil Type - Rosebud very fine sandy loam. Fertilizer - None. Spacing - Hills 12", Rows 36". Date Planted - June 19, 1957. Date Harvested - September 27, 1957.

REMARKS	Rainfall	Mean Temperature °F.		
		Max.	Min.	Mean.
June	3.05 + .34	75.0	49.8	62.4 - 2.0
July	.93 - .58	90.4	57.5	74.0 + 0.6
August	2.87 +1.38	86.8	57.9	72.4 + 1.0
September	.49 - .76	72.6	41.5	57.1 - 4.1

Sprays applied: one insecticide spray for psyllids. Trial located on land which was in alfalfa for several previous years. Vines still entirely green when harvested on September 27, 1957. At this date vines of only a few selections were maturing. Consequently yields of later varieties did not attain their maximum. However, as this was after the longtime average first killing frost date it was a fair time at which to terminate the test. Scab was present to a serious extent even though - with alfalfa preceding potatoes - there was no special reason to anticipate severe scab. Had the trial been harvested a week or ten days later scab lesions would have been of a much more severe type and incidence would have been greater.

North Dakota. Cooperator - R. H. Johansen. Location - Grand Forks, North Dakota. Soil Type - Bearden clay loam. Fertilizer - 150 lbs. 16-16-8. Spacing - Hills 12", Rows 38". Date Planted - May 13, 1957. Date Harvested - September 24, 1957.

REMARKS - Rainfall was below and temperature above normal during July and early August. Environmental factors were somewhat unfavorable for potatoes. Plots were sprayed regularly with DDT and Toxaphene with later applications of dithane. The vines were killed by rotobating on September 9. Cool, wet weather at planting time contributed to the poor stands in some varieties. Purple top was common in most varieties. Specific gravity was determined by the use of the potato hydrometer, using eight pounds of potatoes from each replication.

Ohio. Cooperator - John Bushnell. Location - Wooster, Ohio. Soil Type - Wooster silt loam. Fertilizer - 1200 lbs. 5-10-10. Spacing - Hills 11" Rows 36". Date Planted - May 28, 1957. Date Harvested - September 30, 1957.

REMARKS - Rainfall and temperature were approximately normal. High temperature the week of September 1 was followed by rapid dying of tops of several entries. Six sprays of Dieldrin, DDT and Dithane were applied. Specific gravity determinations were made with a potato hydrometer on two 8-pound samples from each row. Depth of water in the tank did not permit the instrument to register over 1.085. Accordingly, some entries listed as 1.085 may be actually higher.

Wisconsin. Cooperator - G. H. Rieman. Location - Rhineland, Wisconsin.
Soil Type - Sandy loam. Fertilizer - 800 lbs. 5-20-20. Spacing - Hills
12" Rows 36". Date Planted - June 10, 1957. Date Harvested - September 23,
1957.

REMARKS - Growing conditions were normal for the area except for a three week drought period in August. Parzate was used on a seven-day schedule and Parzate plus DDT was used on a 21-day schedule. The vines were partially killed by frost prior to harvest. Specific gravities were determined at harvest time with a potato hydrometer. Test plot selected for freedom from scab.

North Central table 2. Yields of U. S. No. 1 and Percent of Total Yields which were U.S. No. 1 Size.

Variety	Ind.		Iowa		Mich.		Minn.		Neb.		N.D.		Ohio		Wis.		Average
	Early	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	Bu. Pct.	
I 961-1		418 89	602 92	142 54	113* -	172 79	139 41	302 92	395 95	465 95	329 80						
Tawa		499 88	382 91	160 68	121 -	176 69	127 38	212 91	395 93	431 88	298 78						
Mich. R 139-9		685 96	508 94	234 72	154 -	272 82	183 46	290 96	387 94	525 96	385 84						
Minn. 60.48-10-52		690 89	544 88	102 50	168 -	143 75	138 42	- -	350 94	515 91	354 75						
Minn. 69.49-4-51		592 95	523 94	96 49	130 -	74 58	196 84	205 91	322 94	455 94	308 82						
Neb. 223.48-IX		639 91	511 90	79 29	103 -	172 56	310 70	365 95	404 93	476 91	369 77						
Neb. 82-49 - IX		1082 89	458 85	192 58	172 -	219 67	234 51	326 94	456 92	587 92	444 78						
Red bake		511 95	347 83	152 61	135 -	167 70	118 38	359 93	327 92	460 89	305 78						
N.D. 2906-1		675 92	431 87	254 63	200 -	253 74	257 65	316 90	410 93	515 92	389 82						
N.D. 2774-3		717 89	371 94	164 55	115 -	196 72	162 75	179 89	309 91	421 90	315 82						
N.D. 3324-2		581 92	621 91	133 50	143 -	203 81	181 50	471 95	325 94	479 92	374 81						
B 605-10		685 95	509 96	189 62	148 -	241 82	93 30	356 96	427 94	532 96	379 81						
Wis. x 137.52		668 91	424 84	126 50	97 -	148 54	177 71	221 95	402 94	426 93	324 79						
Wis. x 143.52		705 91	317 85	143 54	119 -	153 57	186 65	219 95	388 93	428 95	317 79						
Ag. 56.55		957 93	546 88	175 53	150 -	219 72	254 72	319 94	472 94	537 93	435 82						
Triumph		820 93	477 91	80 35	128 -	98 51	98 21	317 96	426 94	479 91	349 71						
Cobbler		602 90	764 95	285 71	185 -	259 76	14 3	373 94	467 93	423 86	398 76						
LSD .05		164	131	82	54	43	-	86	63	90							
.01		219	175	110	72	58	-	115	84	121							
<u>Late</u>																	
I 801-10		695 96	582 97	231 87	197 -	262 81	94 32	294 98	314 97	442 90	364 85						
N.D. B 3627		586 87	420 90	297 80	149 -	149 73	212 67	302 95	381 95	515 95	358 85						
B 595-76		695 94	290 87	172 77	139 -	170 64	57 70	181 89	285 93	452 90	288 83						
B 926-9		840 95	484 89	234 69	150 -	230 75	235 64	305 96	438 96	539 94	413 85						
Red Pontiac		1231 96	611 94	258 68	246 -	301 85	252 44	415 98	568 96	436 91	509 84						
LSD .05		280	113	95	34	51	-	80	59	115							
.01		393	158	134	49	72	-	112	81	162							

* Total yield not U.S. No. 1.

North Central table 3. Maturity classification.

Variety	Ind.	Iowa	Mo.	Neb.	N.D.	Ohio	Wis.	Ave.
<u>Early</u>								
I 961-1	1.5	2.5	3.0	1.8	2.2	3.5	2.6	2.4
Tawa	2.5	2.7	2.2	3.3	2.7	2.1	2.7	2.6
Mich. R 139-9	2.5	2.2	2.0	3.0	2.7	2.1	2.5	2.4
Minn. 60.48-10-52	4.0	3.5	2.2	3.2	-	2.6	2.9	3.1
Minn. 69.49-4-51	1.0	1.6	2.5	2.8	3.2	2.0	2.2	2.2
Neb. 223.48-IX	1.5	2.6	3.1	3.3	2.7	2.6	3.2	2.7
Neb. 82-49-IX	3.5	4.0	2.1	3.6	4.0	3.0	4.0	3.4
Red Bake	1.8	3.5	3.7	2.7	4.2	2.5	4.0	3.2
N.D. 2906-1	1.5	1.0	2.0	2.1	2.0	1.2	2.0	1.7
N.D. 2774-3	2.5	1.2	2.2	1.8	1.2	1.5	3.4	2.0
N.D. 3324-2	1.8	1.2	2.2	2.9	3.0	2.5	3.5	2.4
B 605-10	2.5	1.2	2.5	3.0	3.0	2.1	3.1	2.5
Wis. x 137.52	4.0	3.5	2.5	3.8	3.7	2.6	3.1	3.3
Wis. x 143.52	4.0	3.6	2.8	3.5	3.7	2.5	3.1	3.3
Ag. x 56.55	4.8	4.0	2.8	4.1	4.7	4.0	3.6	4.0
Triumph	2.5	2.6	2.0	2.1	2.0	2.0	3.0	2.3
Cobbler	2.5	2.4	2.5	3.7	2.0	2.0	2.7	2.5
<u>Late</u>								
I 801-10	3.5	4.0	3.2	4.5	3.2	3.5	3.9	3.7
N.D.-B 3627	3.5	3.5	4.0	4.2	4.5	3.5	3.5	3.8
B 595-76	2.5	4.0	3.7	4.0	4.7	4.0	3.7	3.8
B 926-9	4.0	4.0	3.7	3.7	3.7	3.2	3.7	3.7
Red Pontiac	3.5	3.7	3.7	3.9	3.0	2.6	3.9	3.5

- 1 = Very early
- 2 = Early
- 3 = Medium
- 4 = Late
- 5 = Very late

North Central table 4. Total solids.

Variety	Ind.	Iowa	Mich.	Minn.	Mo.	Neb.	N.D.	Ohio	Wis.	Ave.
<u>Early</u>										
I 961-1	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Tawa	15.6	16.2	18.0	18.4	16.5	18.8	18.0	18.4	19.9	17.7
Mich. R 139-9	17.5	16.0	17.7	18.6	18.2	19.9	19.4	18.6	20.1	18.4
Min. 60.48-10-52	16.5	15.8	18.6	19.0	18.2	20.3	18.2	18.2	19.0	18.2
Min. 69.49-4-51	16.5	14.5	15.0	18.8	16.5	18.2	-	17.5	18.2	16.9
Neb. 223.48-IX	13.7	13.3	14.5	17.7	16.5	17.1	15.8	15.0	17.7	15.7
Neb. 82-49-IX	15.4	15.4	16.2	19.2	16.9	20.3	19.0	19.2	20.5	18.0
Red Bake	19.2	17.1	21.6	-	20.1	20.3	20.9	20.5	21.8	20.2
N.D. 2906-1	16.7	15.0	17.7	18.4	17.7	20.9	18.8	20.5	21.4	18.6
N.D. 2774-3	15.0	14.5	16.0	19.4	16.7	17.7	18.0	16.9	18.4	16.9
N.D. 3324-2	18.6	15.8	16.2	18.4	18.0	19.7	19.4	18.4	21.8	18.5
B 605-10	17.3	16.0	16.5	18.8	18.2	19.7	18.8	18.8	20.5	18.3
Wis. x137.52	17.5	16.7	18.0	18.6	17.5	21.2	20.7	19.2	20.7	18.9
Wis. x143.52	18.8	16.7	19.2	20.5	18.4	22.0	20.5	20.3	21.4	19.7
Ag. 56.55	18.8	16.2	19.9	20.5	18.6	21.8	19.9	20.1	21.6	19.7
Triumph	18.2	16.9	19.0	17.7	18.4	19.7	19.2	20.3	21.6	19.0
Cobbler	16.7	14.3	16.7	17.1	15.6	18.6	19.2	17.3	19.4	17.2
<u>Late</u>										
I 801-10	17.5	17.5	18.0	17.7	18.8	20.7	20.1	18.8	20.9	18.9
N.D.-B3627	18.6	17.3	20.9	23.3	18.6	20.9	20.7	20.5	24.8	20.6
B 595-76	17.7	15.8	18.8	21.2	17.5	18.6	17.7	18.2	20.3	18.4
	17.5	14.3	19.2	22.4	19.0	19.2	19.2	19.2	21.6	19.1

continued

North Central table 4 continued

Variety	Ind.	Iowa	Mich.	Minn.	Mo.	Neb.	N.D.	Ohio	Wis.	Ave.
B 926-9	15.8	13.9	16.7	18.4	15.8	18.6	17.7	16.9	18.8	16.9
Red Pontiac	16.2	13.7	15.8	18.6	16.2	17.7	18.2	18.0	18.8	17.0
Ave. for Location	17.0	15.6	17.7	19.2	17.6	19.6	19.0	18.7	20.4	

North Central table 5 - Scab reactions reported^{1/}

Variety	Ind.		Iowa		Mich.		Mo.		N.D.		Ohio		Wis.	
Early	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.	Ar.	Ty.
I 961-1	4	1	T	2	T	3	T	1	1	2	T	1	0	0
Tawa	3	1	3	3	T	1	0	0	1	1	T	1	0	0
Mich. R 139-9	3	1	1	3	T	1	0	0	1	1	0	0	0	0
Minn. 60.48-10-52	3	3	T	3	T	2	T	5	-	-	0	0	0	0
Minn. 69.49-4-51	4	1	T	3	-	-	0	0	1	1	T	1	0	0
Neb. 223.48-IX	4	1	3	2	T	3	T	1	T	1	T	1	0	0
Neb. 82-49-IX	3	3	T	4	T	1	0	0	1	2	1	1	0	0
Red Bake	2	2	T	4	T	3	0	0	2	1	T	3	0	0
N.D. 2906-1	2	2	T	3	1	1	0	0	1	1	0	0	0	0
N.D. 2774-3	3	3	T	3	T	1	T	1	1	1	0	0	0	0
N.D. 3324-2	5	2	2	3	1	1	T	1	2	2	T	1	0	0
B 605-10	2	2	1	2	T	3	0	0	2	1	0	0	0	0
Wis. x 137.52	2	2	3	2	T	2	T	1	T	1	0	0	0	0
Wis. x 143.52	3	2	1	3	1	1	0	0	1	1	T	1	0	0
Ag. 56.55	3	2	1	3	-	-	0	0	1	1	0	0	0	0
Triumph	3	3	T	4	T	2	0	0	3	3	T	1	0	0
Cobbler	4	2	T	4	T	3	T	1	2	2	T	1	0	0
<u>Late</u>														
I 801-10	3	1	3	2	1	1	T	3	1	1	T	1	0	0
N.D. B 3627	3	2	1	3	T	2	T	3	3	2	T	1	0	0
B 595-76	4	2	3	2	T	1	T	1	2	2	T	1	0	0
B 926-9	3	1	3	2	T	1	0	0	1	1	0	0	0	0
Red Pontiac	4	3	T	4	T	4	0	0	2	2	0	0	0	0

^{1/} Area

T = less than 1%
 1 = 1 - 20%
 2 = 21 - 40%
 3 = 41 - 60%
 4 = 61 - 80%
 5 = 81 - 100%

Type of Pustule

1 = small, superficial
 2 = larger, still superficial
 3 = large, rough pustules
 4 = large pustule, shallow holes
 5 = large pustule, deep holes

North Central table 6. Average external defects.

Variety	Scab	Growth	Second	Sun
Early		Cracks	Growth	Green
	Pct.	Pct.	Pct.	Pct.
I 961-1	26.9	1.6	1.2	5.8
Tawa	27.9	5.2	1.2	11.1
Mich. R 139-9	30.6	5.2	2.4	10.4
Minn. 60.48-10-52	26.1	0.3	1.6	9.2
Minn. 69.49-4-51	23.2	1.6	0.2	2.0
Neb. 223.48-IX	23.5	1.2	1.0	6.5
Neb. 82-49-IX	32.2	1.4	1.7	2.7
Red Bake	31.1	1.6	0.7	1.3
N.D. 2906-1	24.7	2.2	0.1	1.7
N.D. 2774-3	27.9	2.0	0.0	3.1
N.D. 3324-2	39.7	3.2	0.1	8.3
B 605-10	30.1	6.7	0.2	8.1
Wis. x 137.52	22.9	1.5	0.6	3.8
Wis. x 143.52	24.9	3.0	0.6	3.1
Ag. 56.55	23.0	3.9	2.7	3.9
Triumph	36.6	4.1	2.7	0.9
Cobbler	44.6	1.0	1.6	6.1

Late

I 801-10	35.6	4.1	1.1	7.4
N.D. B 3627	34.1	5.7	1.1	9.9
B 595-76	33.5	10.7	1.5	8.2
B 926-9	25.5	2.1	0.7	6.4
Red Pontiac	41.9	1.4	2.1	2.5

North Central table 7. Percent internal defects.

Variety	Hollow	Internal	Vascular	Normal
Early	Heart	Necrosis	Discoloration	Tuber
	Pct.	Pct.	Pct.	Pct.
I 961-1	1.1	1.2	18.4	81.7
Tawa	0.4	1.4	17.5	80.9
Mich. R 139-9	0.9	4.0	7.2	87.9
Minn. 60.48-10-52	0.3	2.3	7.4	90.0
Minn. 69.49-4-51	0.2	2.1	14.6	83.0
Neb. 223.48-IX	1.4	1.1	9.1	88.7
Neb. 82-49-IX	4.2	1.5	13.2	81.6
Red Bake	4.7	0.5	11.1	83.6
N.D. 2906-1	0.6	0.2	5.4	93.7
N.D. 2774-3	2.2	1.7	10.0	87.0
N.D. 3324-2	1.6	3.1	14.2	81.2
B 605-10	2.1	1.1	14.4	82.4
Wis. x 137.52	0.2	0.0	8.0	91.7
Wis. x 143.52	1.1	0.4	11.1	87.6
Ag. x 56.55	0.0	0.5	4.6	94.9
Triumph	0.7	1.0	15.4	83.4
Cobbler	6.2	3.4	24.0	67.5

continued

North Central table 7 continued.

Variety	Hollow	Internal	Vascular	Normal
Early	Heart	Necrosis	Discoloration	Tuber
	Pct.	Pct.	Pct.	Pct.
<u>Late</u>				
I 801-10	4.0	0.4	8.5	87.1
N.D. B 3627	9.7	0.6	6.0	83.7
B 595-76	2.2	1.4	17.0	79.5
B 926-9	0.4	1.1	5.9	92.6
Red Pontiac	2.2	0.4	12.6	84.7

North Central table 8. Merit ratings.

Variety							Total
Early	Ind.	Iowa	Mo.	Neb.	N.D.	Wis.	Merit Points
I 961-1		2				5	5
Tawa						2	4
Mich. R 139-9			1			3	8
Minn. 60.48-10-52							
Minn. 69.49-4-51							
Neb. 223.48-IX				1			5
Neb. 82-49-IX				2	2		8
Red Bake	4						2
N.D. 2906-1			3		1		8
N.D. 2774-3							
N.D. 3324-2		1			3	1	13
B 605-10		3	5		4		6
Wis. x 137.52	1						5
Wis. x 143.52						4	2
Ag. 56.55	2	4		3			9
Triumph							
Cobbler							

Late

I 801-10	3	5	4				6
N.D. B 3627							
B 595-76							
B 926-9	5		2	4	5		8
Red Pontiac				5			1

Merit Points Determined as follows:

Merit Rating	Merit Points
1	5
2	4
3	3
4	2
5	1

PACIFIC NORTHWEST
John G. McLean

Leafroll resistance. In testing 34 russet lines for leafroll resistance in first year plantings at Parma, Idaho, the following 5 lines showed no symptoms or doubtful symptoms of leafroll:

A321-1	White Rose x B2834-3
A321-2	" "
A327-3	All9-20 x B24-58
A150-53	A137-5 x Menominee
A350-3	Kennebec x All9-15

The following 4 lines produced no net necrosis at harvest time when tubers of susceptible lines showed 80 percent net necrosis:

A180-26	E. Gem x B2756-2
A180-24	" "
A163-4	Russet Burbank x B2756-6
A350-3	Kennebec x All9-15

From 17 lines obtained from R. V. Akeley only B3391-16 (B859-10 x B24-58) showed no leafroll symptoms on first year testing. From the 482 lines obtained from R. V. Akeley in 1956 only one, B3820-14 (B927-3 x Katahdin), survived replanting for the second year without showing leafroll symptoms.

Several lines, including Sequoia and Populair showed strong recovery in 1956 after early symptoms of severe leafroll. When replanted in 1957 all were severely affected. B3807-6 (B2944-65 x B2067-52) was the only line which again showed recovery in 1957 after moderate to severe symptoms early in the growing season.

The line B2759-5 (B24-58 x 247-24) had survived 4 years of replanting in the leafroll test. In 1956, however, a few stunted plants showed apical rolling but no roll of the lower leaves. Current-season leafroll appeared on a few adjacent plants later in the year. Dr. R. E. Webb identified strain 3, leafroll in both types of plants.

In 1957 the primary leafroll, current season and "healthy" were replanted from this same lot of B2759-5. Primary leafroll plants were dwarfed to 12 inches in height, dropped the lower leaves and showed apical symptoms of leafroll. Plants grown from the previous "current season" seed were 18 inches in height and produced apical symptoms, and lost the lower leaves. Tubers from the "healthy" produced apparently normal plants 28 to 36 inches high with no symptoms of leafroll or leaf drop.

B2759-5 has appeared to be the most resistant line tested at Parma in the past 6 years. While infection in most lines is serious after exposure for 2 years, B2759-5 has not shown infection except in 1956 when less than 50 percent were infected and the non-infected plants apparently remained healthy. The observations in 1957 would not indicate that B2759-5 was a masked carrier of leafroll although the symptoms were not normal.

The survival of A321-1 and A321-2 in 1957 may indicate that the mild resistance found in White Rose can be developed for stronger resistance. Both parents, White Rose and B2834-3, have been susceptible in previous tests.

Dr. R. W. Hougas, of the Potato Introduction Project, Sturgeon Bay, Wisconsin, furnished 100 lines for testing. Numbers 208336 and 208332 were outstanding for growth and resistance in the first-year test. The results are as follows:

No leafroll symptoms:

215618	SSRPB 2070(30)
214372	Hybrid- <u>S. andigenum</u> in pedigree
208332	Aquila x (Erdgold x hybrid 9089)44
208336	Aquila x (Flava x hybrid 9089)

Questionable or very slight leafroll symptoms:

161695	<u>S. andigenum</u>
222943	Cockerham 1519(b)9 unknown pedigree
214373	Hybrid <u>S. andigenum</u> and <u>S. demissium</u> in pedigree
214374	Ditto
195162	<u>S. andigenum</u>

Slight or moderate leafroll symptoms:

161131	226605	208353	194684	208329	205396
161182	222948	203904	194681	208330	205622
230660	222947	203901	208326	208343	
230659	214421	201404	208324	208344	
230499	215617	203902	208323	208349	

Severe leafroll symptoms:

182537	230662	222946	214422	203903	208319
182544	230497	222945	214429	203900	205624
182545	230946	215623	214430	203899	208331
186177	230457	215622	214375	201407	208333
186180	226608	215621	214371	201405	208334
189473	226607	215620	208596	194666	208341
201403	226606	215619	208340	195211	208350
222944	226603	214436	205392	194665	
226609	225630	214435	205388	208327	(225636
CCC-53-5-2	222952	215619	204342	208328	No emer-
CCC-50-57-67	222950	214433	203905	208325	gence)
		214431			

Verticillium resistance. The yield and quality of 3 advanced russet selections and Russet Burbank in the Verticillium wilt test are shown in Idaho table 1. All 3 were more resistant than Russet Burbank and produced significantly higher yields. Only A175-7 was significantly higher in yield of U.S. No. 1 tubers.

Idaho table 1. Yield Verticillium index, and quality of 4 varieties at Rexburg, Idaho, 1957.

Variety	Vertc. Index	Total Yield	U.S.No.1 Yield	Total Solids
		Sx/A.	Sx/A.	
Al79-9	29.2	342.7	204.7	19.4
Al75-7	54.0	338.3	304.9	19.0
Al80-26	33.2	332.5	193.1	18.9
Russet Burbank	82.8	235.2	174.2	19.2
L.S.D. at 5%	12.9	82.7	52.3	
1%	18.1		74.0	

5 replications, 10 hills each in randomized blocks.

Verticillium wilt and yield of 13 lines is shown in Idaho table 2. Because of the higher variability in this test only 5 lines significantly exceed the yield of Russet Burbank and only Al73-3 produced significantly more U.S. No.1 tubers.

Idaho table 2. Yield and Verticillium index of 13 lines at Rexburg, Idaho, 1957.

Line	Vertc. Index	Yield	
		Total	U.S. No.1
		Sx/A.	Sx/A.
Al15-9	1.5	421.1	245.4
Al80-24	36.5	394.9	251.2
A27-2	.0	203.3	100.2
Al20-5	2.0	367.4	78.4
A244-4	1.5	259.9	127.8
Al83-11	.0	162.6	124.9
Al80-25	73.0	310.7	216.4
Al70-9	25.5	426.9	235.2
Al80-2	47.0	325.3	184.4
A348-3	77.5	283.1	113.3
Al80-27	64.0	280.2	168.4
Al73-3	59.0	381.9	303.5
Russet Burbank	80.5	233.3	173.1
L.S.D. at 5%	19.2	124.8	94.4
L.S.D. at 1%	26.9		

2 replications, 10 hills each, in randomized blocks.

In tests where the second replication was lost or where only one lot was planted, several lines produced high total and U.S. No. 1 yields. These are shown in Idaho table 3.

Idaho table 3. Yield and Verticillium index of non replicated lines at Rexburg, Idaho, 1957.

Line	Vertc. Index	Yield	
		Total Sx./A.	U.S. No.1 Sx./A.
A330-4	30	515.5	435.6
41956	5	396.4	193.1
A179-13	31	335.4	120.5
A150-53	36	332.5	156.8
A247-20	30	328.5	210.5
A116-58	0	284.6	116.2
Menominee	0	259.9	156.8
A327-1	50	258.5	106.0
A163-4	73	251.2	101.6

10 hill lots, no replication.

No significant correlations were obtained between Verticillium wilt and yield in 1957. Severely affected and low yielding lots were not harvested. Several lines (A180-25, A180-27, A173-3) produced relatively high yields even though the Verticillium index was near 60 or above.

Growth-regulating chemicals applied to whole or cut seed tubers of Russet Burbank again reduced the severity of disease symptoms in 1957. Treatment reduced the total yield, however, from 318 Sx./A. for the paired untreated controls to 211 Sx./A. The yield of U. S. No. 1 tubers was reduced from 231 Sx./A. for the controls to 103 Sx./A. average for the treated lots.

Variety trial, Parma, Idaho. Six varieties were planted in 50-hill single-row plots, replicated 5 times, on April 3. The tops were beaten off August 12, prior to harvest on August 21. The length of growing season was probably not sufficient for some of the varieties. Plantings were made by John McLean, harvest records were obtained by Richard Foley. The results are shown in Idaho table 4.

Idaho table 4. Yield and quality of 6 varieties at Parma, Idaho, 1957.
Foley and McLean.

Variety	Yield				Total Solids
	U.S.No.1	U.S. No.2	Cull	Total	
	Sx./A.	Sx./A.	Sx./A.	Sx./A.	
A180-26	214.0	55.7	88.5	358.2	19.1
A170-9	202.1	50.8	71.3	324.1	21.7
Russet Burbank	164.5	69.8	94.8	329.1	23.0
Early Gem	103.6	51.7	40.8	196.1	19.7
Triumph	267.7	36.9	51.5	356.2	23.7
White Rose	265.3	82.6	100.1	448.0	21.9
L.S.D. at 5%	13.8	6.5	9.9	15.0	
L.S.D. at 1%	18.8	8.9	13.5	20.5	

The highest total yields were produced by White Rose, Triumph and Al80-26. In the production of U.S. No.1 tubers the 4 other varieties significantly exceeded Early Gem and Russet Burbank. Harvest notes by Richard Foley are summarized as follows:

Al80-26. A late variety which needs more time. Much of the cullout was small potatoes. Skin was corky and deeply checked and tuber had poor surface appearance. The flesh was attractive and White. No internal necrosis was found. I believe this variety has possibilities as a processing potato.

Al70-9. A late variety which needs more time. Second growth was heavy and field sprouting common. The skin was rough, corky and heavily checked. Should be given consideration as a processing potato.

Russet Burbank. Much second growth and some growth cracking. Still a good potato. Did well.

Early Gem. In general it looked good. Very heavy growth cracking and much second growth. Many small tubers were found.

Triumph. Very good yields, good specific gravity and nice looking tubers. Little growth cracking and second growth.

White Rose. Many oversized rough and poor appearing tubers were found. Growth cracking was present and second growth was almost universal.

Potato Selection Committee. After field and tuber selection 16 lines were recommended by the committee. Four lines were already under test and a foundation seed supply was grown at the Tetonia, Idaho, Branch Station. The 12 new selections will be indexed, stem-smear and a seed source developed at Tetonia.

The 2 lines Al70-9 and Al80-26 are being developed and tested for possible release. Both are Verticillium wilt and scab resistant, russet and generally high yielding. In addition Al80-26 has shown net necrosis resistance for 2 years and was resistant to virus A in greenhouse tests. A heavy skin which shows some surface cracking may make Al80-26 unacceptable as a fresh-market potato. Preliminary cooking tests indicated that both Al80-26 and Al70-9 compared favorably with Russet Burbank.

SOUTHERN PROJECT
Louisiana Headquarters
T. P. Dykstra

The climatic conditions in the spring of 1957 were just about ideal for potato growing in the South. This was especially true in Louisiana. Since there was no late frost to injure the plants after emergence, and a sufficient but not excessive amount of rainfall, combined with mild temperatures, a maximum yield resulted. Quite often adverse weather conditions prevent the expression of the potentials of potato seedlings tested in the South, but this was not true of the spring of 1957.

A total of 44 of the best seedlings from the standpoint of disease resistance and general performance were selected from the increase plots in Tennessee to be tested in 3 different locations in Louisiana, namely, Baton Rouge, New Roads, and Port Sulphur. Twenty-five hills of each seedling were spaced at 12 inches in rows $3\frac{1}{2}$ feet apart, with the exception of the New Roads location where the rows were 6 feet apart. (See Dykstra, table 1).

Enough tubers of the more advanced seedlings were sent to several of the cooperating southern States to plant in replicated yield plots. The yield and performance of these seedlings will be reported by these States.

Several seedling varieties looked very good, but the most promising one was TL 6279. This is a selfed seedling of TL 1859. We had been considering introducing and naming the latter on account of its many desirable qualities. It produces a high yield, it is widely adapted, its cooking quality is excellent, and it has field resistance against late blight as well as scab resistance. The only drawback to it is that instead of a desirable bright red color, the tubers are generally light red and pink in heavy soils. We had hoped to find eventually a red mutation as has been found in the Pontiac and LaSoda varieties but have failed to find one. We have not discarded this seedling variety since it is an excellent fertile parent. In the near future, it is inevitable that the various processed potato products will greatly increase in importance; hence, skin color will become of minor importance. When that time arrives seedling TL 1859 may become a very desirable variety.

From several hundred selfed seedlings of TL 1859, only one seedling has been retained, namely, TL 6279. This one appears to have practically all the desirable qualities of TL 1859, including high yield. In spite of a rather low specific gravity, it has excellent cooking qualities as well as disease resistance against scab and blight. Its tubers have a desirable shape and bright red color. This variety has been tested in Louisiana, Alabama, Florida, Mississippi, Tennessee, and also in the northern States, such as South Dakota, Iowa, North Dakota, and Wisconsin. In all these States the preliminary results so far have been most encouraging. Dr. August Kehr, after testing it in Iowa, stated in a letter: "I gave it tops for general appearance. It was highly scab-resistant with only type 1 scab, which is very good considering the bad scab found in our plots this year."

This fall a yield plot was planted in southern Louisiana from seed harvested from the Louisiana 1957 spring crop. Because of the extremely heavy rainfall during the fall months, most of the seed rotted and the remaining plants produced only a few tubers. In this plot TL 6279 was really outstanding. There was a good stand and it produced a yield of 150 bushels of U.S. No. 1 tubers per acre.

In the South, where unfavorable climatic conditions for potato production prevail fairly often, it is desirable to have a variety of natural toughness that can produce a satisfactory crop in spite of adverse growing conditions. From this point of view also TL 6279 looks exceedingly promising. It is now being increased, and, if it continues to look promising, it will be named.

In cooperation with the Food Technology Laboratory of the University of Louisiana, several of the seedlings are tested for potato processing products. A few of these seedlings have proven to be very good for processing but, unfortunately, these seedlings were lacking in yielding qualities. Increased attention will be given to the development of processing qualities in the potato. Since food processing is developing at such a rapid rate and meeting with such favorable consumer response, it undoubtedly will affect drastically the production and marketing of potatoes in the not too distant future.

At the Cumberland Plateau at Crossville, Tennessee, where the increase plots of our seedlings are located, most of the seedling varieties flowered, and most of these had pollen. Many crosses were made and a good seed set resulted. After pollination there was an extended dry period and several of the seed balls dropped. Because of this the seed crop was considerably less than we had hoped for. Also, this may have affected the germination of the seed since some of the seed had very low germination.

Our experience in using scab-infested soil in the field to test seedlings for scab resistance has given results that are too variable and inconsistent. In some years an abundance of scab may develop; in other years in the same plot practically no scab lesions are evident, not even on the susceptible checks. We are, therefore, continuing to rely primarily on scab-infested vermiculite, artificially inoculated, as a medium to test seedlings for scab resistance. This has given us consistently positive results regardless of climatic conditions.

There was considerable blight this year in Louisiana in the spring crop and some of it was also evident in the fall crop. Late blight in this State is not an annual occurrence and for that reason every precaution has to be taken not to introduce a source of infection. It is not considered advisable to produce artificial infection in a blight plot in the field for fear that the causal organism may spread to the commercial potato-growing areas of the State. All our seedlings from blight-resistant parents are tested for resistance to blight by spraying the young plants growing in pots with a water suspension of spores of Phytophthora infestans in an air-conditioned moist chamber in the greenhouse. This testing is conducted during a period when no potatoes are grown in Louisiana. After the testing has been completed, the chamber is thoroughly disinfected.

Dykstra table 1. Yield in bushels of U.S. No. 1 potatoes per acre, on basis of performance of seedlings in plots 1/500 of an acre in Port Sulphur and Baton Rouge, and 1/290 of an acre in New Roads, Louisiana.

Accession Number	Parentage	Port Sulphur Bu.	Baton Rouge Bu.	New Roads Bu.	Ave. Yield Bu.	Ave. Solids Pct.	Segregating for:	Tuber Appearance
TL 6423	TL 1859 x B2336-2	365	450		408	16.0	Red, Sc, B	good shape & color
TL 4819	TL 870 x B2368-1	330	358	256	315	18.4	Red, B	good shape lt. red
TL 6539	B2368-4 x B2997-9	265		310	287	18.7	Red, Sc	good shape & color
TL 6279	TL 1859 selfed	375	450	324	383	17.2	Red, Sc, B	very good shape & color
TL 6264	TL 2778 x B2368-4	189	225	145	186	18.7	Red, Sc	small, shape & color fair
TL 6605	B2368-4 x B3131-8	242			242	17.7	Red, Sc, B	small, shape & color fair
TL 6017	B2368-4 selfed	410			410	18.2	Red, Sc	rough
TL 6226	TL 2778 x B2368-4	442	492	407	439	18.7	Red, Sc,	good color & shape
TL 1859	Pontiac x 96-56	325	525	353	401	17.7	Red, Sc, B	long, pink
TL 6112	Minn.43-46-6 x Ia 947-10	259		179	219	21.4	Red, Sc, B	shape fair color pink
TL 6006	B355-24 x 96 -56	175	348	174	232	18.9	White, B	medium, shape good
TL 6088	LaSoda x B2368-4	535	450	411	465	18.2	Red, Sc	good color & shape
TL 6519	B2368-4 x B2997-9	435	195	252	294	17.2	Red, Sc	long, red, smooth
TL 6181	C210-B874-24 x Ia 947-10	233	283	266	261	19.2	Red, Sc, B	small, shape fair
TL 6095	LaSoda x B2368-4	207		246	151	19.2	Red, Sc,	medium, shape & color fair
TL 6136	B2875-8 x Ia 947-10	141	233	150	175	20.5	Red, Sc	small, good color and shape
TL 6233	TL 2778 x B2368-4	325	141	396	287	14.7	Red, Sc	shape fair, pink
TL 6440	B3006-22 x B2968-31	208	183	208	200	17.2	White, Sc, B	fair
TL 6520	B2368-4 x B2997-9	350	400	121	290	16.9	Red, Sc	pink
TL 6156	B2993-4 x Ia 947-10	165	108	159	144	20.2	Red, Sc, B	good shape & color
TL 6420	TL 1859 x TL 2336	317	308		312	17.3	Red, Sc, B	rough pink
TL 2988	96-56 x Sebago	494	450		472	20.2	White, B	good shape, smooth

continued

Dykstra table 1, continued.

Accession Number	Parentage	Port	Baton	New	Ave.	Ave.	Segregating for:	Tuber Appearance
		Sulphur	Rouge	Roads	Yield	Solids		
		Bu.	Bu.	Bu.	Bu.	Pct.		
TL 6265	TL 2778 x B2368-4	425	390	258	358	20.5	Red, Sc	good color & shape
TL 5347	B922-24 x B929-32	308	332	145	262	18.2	White, Sc, B	shape excellent
TL 6078	Triumph x B2368-4	533	600	426	520	18.7	Red, Sc	good shape & color
TL 6230	TL 1345 x B2997-9	375	466	348	396	18.2	Red, Sc	good shape & color
TL 6614	B2368-4 x B3131-8	375	292	348	338	19.7	Red, Sc, B	shape & color fair
TL 6219	TL 2778 x B2368-4	133	150	198	160	18.7	Red, Sc	excellent shape & color
TL 6196	Ia 976-3 x Ia 947-10	264	240	184	229	19.2	Red, Sc, B	shape & color fair
TL 6097	B2874-4 x Ia 947-1-a	309	375	174	286	19.0	Red, Sc, B	shape fair, color pink
TL 6102	Minn 43-46-6 x Ia 947-10	450	292	300	347	17.4	Red, Sc, B	shape poor
TL 5310	B2336-4 x B2368-2	392	259	252	301	20.4	Red, Sc	shape fair, color pink
TL 6522	B2368-4 x B2997-9	200	259		219	18.4	Red, Sc	shape & color fair
TL 6538	B2368-4 x B2997-9	475	383		429	16.7	Red, Sc	good shape & color
TL 6080	Triumph x B2368-4	309	294	218	274	18.4	Red, Sc	medium, pink
TL 6609	B2368-4 x B3131-8	292	484		337	21.2	Red, Sc, B	good shape & color
TL 6419	B2887-2 x Cherokee	259	309		284	16.5		shape fair
TL 4112	Kennebec selfed	167	342	254		16.9		large, rough
TL 6089	IaSoda x B2368-4	375	266	309	317	17.9		shape fair, pink
TL 6542	B2368-4 x B2997-9	442	516		479	17.9	Red, Sc	good shape & color
TL 6603	B2368-4 x B3131-8	317	350	174	280	17.9	Red, Sc, B	shape & color fair
TL 6467	B2875-8 x B2903-17	216			216	20.5	Red, Sc, B	small, pink
TL 5258	B2326-4 x B2368-4	166			166	18.9	Red, Sc	small, good color
TL 6107	Minn 43-46-6 x Ia 947-10		475		475	17.2	Red, Sc, B	shape and color fair
TL 6695	B76-23 x B2998-1		392		392	19.2	Sc, B	good shape
IaSoda		242	200	126	183	16.5		good shape & color
Sebago		275	350	193	273	17.3	White	good shape & smooth

1/ Seed for all selections was grown at Crossville, Tennessee.

U. S. - Colorado Potato Field Station (Greeley, Colo.)

W. C. Edmundson

Potato breeding studies for 1957 consisted of breeding both red and white varieties with good cooking quality for scab and leaf roll resistance. Some of the scab resistant material and the leaf roll-resistant lots were obtained from Beltsville; to these was added the most promising scab-resistant lots developed at Greeley. Many of the parents were selected for earliness and high specific gravity.

The 1957 tests at Greeley included first-year seedlings in family lines, second-year seedlings in 5-hill lots, increase lots of 32 hills, 100-hill plots, and a yield test of the most promising seedlings.

The growing season of 1957 was favorable for potato production in the Greeley district. The yield per acre and the quality of the crop were good. The percentage of dry matter of the seedlings and varieties grown at the station was high. The appearance, or finish, of the tubers was also good. The rainfall was above normal for the growing season. Ten and thirty-six hundredths inches was recorded at the station from April 1 until September 30. For the month of April, 2.76 inches of rain fell. In May, 4.32 inches was recorded. The supply of irrigation water from streams and reservoirs was adequate.

No late blight was noted at the station and only a small amount of early blight was observed. Five sprays, consisting of DDT, Malathion, and Dithane, were applied for the season. Dieldrin was applied to the soil after planting for the control of the potato flea beetle. Very little flea-beetle injury was observed on the tubers in any of the seedling plots. A large population of aphids appeared late in the growing season. Large populations of aphids have appeared in the potato fields for the past 3 years. The psyllid population was low according to counts made in the spraying experiment. There was a severe epidemic of leaf roll in the district and at the station. This was the third year that leaf roll has been a serious problem in the district.

Forty-six family lines that were developed at the station from crosses made in the greenhouse and twenty-five family lines that were received from Beltsville were planted in the field May 22. A large number of selections were made at harvesttime. These selections will be re-examined and probably 1,000 to 1,200 will be selected for testing in 1958.

In the tests of second-year seedlings, 1,243 were planted in 5-hill lots. A rather large number of these seedlings were discarded during the growing season because of leaf roll. There is some indication that the leaf roll affecting the seedlings is of a different strain than that commonly described. The rolling occurred in many of the seedlings about the time the plants began to mature with no rigidity or leathery texture of the leaves.

The type of rolling was more like the rolling of leaves of plants affected by Psyllid Yellows. The lots that were retained at time of harvest will be re-examined. All lots infected with scab, those indicating a tendency to growth crack, or having other objectionable features will be discarded.

Seed from crosses were planted in the greenhouse August 2 and potted the last of the month. About 75 percent of the lots potted were from seed produced in the greenhouse last spring. The other lots were from seed produced the previous year. The seed planted from the 1957 crosses was selected from crosses made from leaf roll resistant parents. Most of the lots of seed produced in the greenhouse last spring germinated uniformly, and as early as the one-year-old seed.

Fifteen seedlings and varieties were included in a yield test plot. Only a small number of seedlings were included in the test this year as only seed that was tuber-indexed in the greenhouse was included in the test. The plots consisted of 25-hill lots randomized and replicated 5 times. The tubers were graded for size, above and below 1 7/8 inches in diameter. Tubers from each of the 5 replications were used to determine the specific gravity of the seedlings or varieties. The data for yield, specific gravity, and dry matter are given in Edmundson table 1.

Edmundson table 1. Yield test, Greeley, Colorado., 1957

Variety	Yield per Acre		Special Gravity	Total Solids
	Total	Over 1 7/8" diameter		
	Cwt.	Cwt.		Pct.
Triumph	391.7	368.4	1.075	18.7
CS 11889	316.1	306.9	1.081	19.9
CS 13925	453.8	380.0	1.086	20.9
CS 13947	376.4	300.7	1.091	21.9
CS 11918	340.7	316.1	1.090	21.8
CS 13951	403.4	294.6	1.091	21.9
CS 11012	350.5	263.8	1.084	20.5
Rural	356.1	333.9	1.092	22.2
CS 13091	366.5	243.5	1.085	20.7
CS 14585	315.5	265.0	1.082	20.2
CS 13928	420.0	358.5	1.093	22.4
CS 13950	380.7	317.3	1.083	20.4
CS 12240	384.4	334.5	1.090	21.8
CS 13153	447.7	345.0	1.099	23.7
CS 13178	398.5	370.2	1.086	20.9
CS 13222	369.6	289.0	1.089	21.8
L.S.D. at 5 percent		52.3	0.014	
L.S.D. at 1 percent		69.6	0.018	

CALIFORNIA
Glen N. Davis

Field test plots were conducted in Kern, San Benito and Siskiyou counties and breeding work in the greenhouse at Davis, Calif., during 1957.

Three separate plots were located in Kern County. The variety yield test plot and the plot to test for scab resistance were located at the Cotton Experiment Station at Shafter and the third plot to test for resistance to verticillium wilt was located at Tehachapi.

The yield test plot, California table 1, contained 6 named varieties and 12 numbered seedlings. White Rose was considered the check. Five replications were planted of each named variety but available seed limited the planting of the seedlings to a single replication each. Yield and specific gravity were obtained. Since the number of replicates was not uniform, a statistical analysis was not made.

California table 1. Potato varietal yield test, Shafter, California, 1957.

Kind	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5	Mean	Solids
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.		Pct.
White Rose	36.0	34.5	48.0	47.5	25.5	38.3	20.9
Merrimack	28.5	29.0	29.0	33.0	25.0	28.9	22.0
Tawa	30.0	28.0	20.5	25.0	24.0	25.5	20.7
Keswick	32.0	28.5	31.0	31.0	32.0	30.9	22.4
Plymouth	39.0	33.0	36.5	44.0	38.0	38.1	21.9
Kennebec	41.0	41.0	47.5	41.0	46.0	43.3	21.9
B 2162-36	25.0	29.0				27.0	18.4
B 2368-13	23.5	16.5				20.0	19.9
B 2874-4	23.5	28.0				25.7	21.7
B 2922-26	26.0	25.0				25.5	21.7
B 3140-36	29.5	32.0				31.2	21.7
B 3319-30	30.0	27.0				28.5	21.6
B 3427-7	25.5	12.5				19.0	21.9
B 3428-20	39.5	42.0				40.7	21.7
B 3428-41	30.0	30.0				30.0	20.9
B 3453-2	24.0	26.0				25.0	20.9
B 3454-5	30.0	24.0				27.0	21.7
B 3454-14	25.0	26.0				25.5	21.9

Plot size 1/20 acre

Fertilizer 16-20-0 at 600 pounds per acre.

The scab test plot included 33 numbered U.S.D.A. seedlings (20 seedpieces of each) and 215 seedling (3 seedpieces each) from the crosses made at Davis. Data from U.S.D.A. seedlings are presented in California table 2. Two seedlings, A 238-3 and A 119-8, secured from Dr. John McLean were selected to use as parents in the breeding program at Davis. The tubers produced by these two lines were considered 100 percent marketable with only a trace of scab. None of the 215 seedlings originating at Davis appeared really outstanding. However, three seedlings lacking in horticultural characteristics but highly resistant to scab were selected for

for backcrossing to White Rose. Data on the individual seedlings were not taken. They were examined and either discarded or saved.

California table 2. Scab plot, Shafter, California, 1957.

Kind	Tubers No.	Number tubers in class rating										Ave.	Mkt. Pct.
		0	1	2	3	4	5	6	7				
White Rose ch.	85	0	20	24	20	16	5					2.5	51.8
A 238-3	36	0	33	3								1.1	100.0
A 119-8	27	0	19	8								1.3	100.0
A 247-1	40	0	18	17	5							1.7	87.5
A 119-1	62	0	26	22	13	1						1.8	77.4
A 180-2	60	0	26	16	16	2						1.9	60.0
A 180-26	35	0	9	16	10							2.0	71.4
A 248-21	64	0	20	27	14	3						2.0	73.4
A 183-5	59	0	24	16	9	10						2.1	67.8
A 122-1	42	0	8	23	10	1						2.1	73.8
A 104-3	72	4	21	21	18	8						2.1	63.8
A 124-60	37	0	10	9	17	1						2.2	51.3
A 170-8	54	0	18	14	11	11						2.3	59.2
A 1-10	62	0	8	24	24	6						2.4	51.6
B 2162-36	83	0	15	25	30	13						2.5	48.2
A 223-66	58	0	7	18	23	9	1					2.6	43.1
A 223-24	64	0	12	17	21	14						2.6	45.3
A 223-56	67	0	2	11	44	10						2.9	19.4
A 223-21	49	0	10	19	21	8	1					3.0	59.1
B 2874-4	91	0	19	23	15	16	10	8				3.0	46.1
A 170-54	34	0	0	7	20	7						3.0	20.6
B 3140-36	57	0	3	12	11	23	7	1				3.4	26.3
B 3453-2	96	0	0	14	31	43	8					3.4	14.6
A 1-4	84	0	2	8	22	39	11	2				3.6	11.9
B 3428-41	84	0	0	10	17	42	15					3.7	11.9
B 3454-14	83	0	0	8	20	37	18					3.8	9.6
B 3427-7	90	0	2	9	12	26	32	9				4.1	12.2
B 3428-20	97	0	0	6	15	36	30	10				4.2	6.1
A 224-9	37	0	0	1	7	11	18					4.2	2.8
B 3319-30	75	0	2	6	6	32	17	12				4.4	10.6
B 3454-5	90	0	0	2	4	39	34	11				4.5	2.2
B 2922-26	103	0	0	0	9	22	31	41				5.0	0.0
B 2368-13	84	0	0	0	24	40	20					5.1	0.0
A 119-15*													

* Enlarged lenticles so pronounced and general that it confused scab reading. Classes 0, 1 and 2 marketable.

Key to classes of scab: 0, free from scab; 1, 1% of surface area covered with scab; 2, 5% of surface area covered with scab; 3, 15% of surface area covered with scab; 4, 25% of surface area covered with scab; 5, 35% of surface area covered with scab; 6, 60% of surface area covered with scab; and 7, 90% of surface area covered with scab.

Size of plot: 1/20 acre

Fertilizer: 16-20-0 at 600 pounds per acre.

The plot at Tehachapi to test for yield and verticillium wilt resistance included 5 named varieties and 36 U.S.D.A. seedlings obtained from Dr. John McLean. Available seed determined the size of the planting of each lot. On September 4 three plants were selected at random from each lot. Sections were placed on agar plates and readings made to determine if any of the lines were actually resistant to the verticillium organism. In addition, yield and specific gravity determinations were taken. This plot in general did not look good and the yields were lower than might normally be expected. The grower ran short of water before the end of the growing season and as a result yields were reduced. The data from the Techachapi planting are presented in California table 3.

California table 3. Verticillium test plot, Tehachapi, Calif., 1957.

Kind	Seed pieces per rep.	Yield			Solids	Bundles with fungus	Stems with verti- cillium
		Rep. 1	Rep. 2	Rep. 3			
	No.	Lbs.	Lbs.	Lbs.	Pct.	Pct.	Pct.
Plymouth	25	35.5	35.0	35.5	17.6	95.7	100
Merrimack	25	44.0	35.0	26.5	20.9	78.8	93
Keswick	25	32.0	34.0		19.7	90.5	100
Tawa	25	31.5			18.4	88.8	100
Rushmore	25	8.5			17.9	48.3	60
B 3140-36	25	13.5	12.5		17.7	81.6	100
B 3428-41	25	14.0	19.0			all dead	
B 3453-2	25	12.0	38.0		18.4	80.4	100
B 3428-20	25	9.0	16.0		20.7	75.0	40
B 2162-36	25	23.0	18.0		19.7	58.3	90
B 3454-14	25	20.0	24.0			all dead	
B 2868-13	25	28.5	12.0		18.4	55.0	100
B 3319-30	25	37.0			18.7	60.0	80
B 2874-4	25	18.5			17.7	70.6	100
B 2922-26	25	34.5			16.7	83.3	80
B 3454-5	25	31.0			18.7	65.6	100
A115-9	10	23.0			19.7	57.6	100
A183-5	10	17.0				63.3	80
A116-58	10	16.5			19.9	78.7	80
A180-30	10	11.0			19.4	79.3	80
A179-13	10	13.0			16.7	90.0	100
A244-4	10	18.5			19.0	83.3	100
B 3126-16	10	17.0			18.2	88.8	100
A 102-18	10	18.5			22.4	86.2	100
A 180-25	10	15.0			18.0	73.3	100
A 180-27	10	-			-	80.0	100
A 180-24	10	17.5			17.2	64.5	100
A 183-8	10	17.0			17.4	12.9	60
A 246-35	10	14.0			16.7	58.3	40
A 173-3	10	17.5			17.7	62.0	80
A 177-51	10	15.0			17.7	90.6	100

continued

California table 3, continued.

Kind	Seed pieces per rep.	Rep. 1	Rep. 2	Rep. 3	Solids	Bundles with fungus	Stems with verti- cillium
	No.	Lbs.	Lbs.	Lbs.	Pct.	Pct.	Pct.
A 167-6	10	12.5			17.4	73.3	100
A 150-53	10	13.0			18.2	26.7	60
A 167-3	10	15.5			17.4	87.5	100
A 120-5	10	13.5			19.4	74.1	100
A 170-1	10	14.5			18.4	97.0	100
A 170-5	10	19.0			17.9	81.8	100
A 180-20	10	17.0			18.2	100.0	100
A 223-67	10	14.0			18.9	54.1	80
B 3200-2	9	12.5			19.0	50.0	60
B 3200-4	5	-			-	all dead	

Size of plot 1/20 acre.

Fertilizer 16-20-0 at 600 pounds per acre.

The San Benito trial (for verticillium resistance and yield) included 38 U.S.D.A. seedlings and 6 named varieties. Data presented in California table 4 show yield, specific gravity and number of days from planting to death of the vines. Some of the differences in length of growing period may be attributed to differences in natural maturity; however, it is also indicative of resistance or susceptibility to Verticillium wilt.

California table 4. Verticillium wilt test plot, Rollister, Calif., 1957

Kind	Seed pieces per replicate	Yield	Days from planting to death of vines	Solids	Remarks
	No.		No.		
Rushmore	20	20.5	97	17.2	
Boone	20	20.0	111	18.9	
Tawa	20	26.5	111	16.7	
Keswick	20	29.5	104	17.9	
Plymouth	20	34.5	111	17.2	
Merrimack	20	23.5	111	19.7	
B 3428-20	20	26.5	97	16.7	
B 3453-2	20	19.5	118	18.4	
B 2874-4	20	40.5	111	17.9	Red
B 3140-36	20	26.5	97	17.2	
B 3319-30	20	32.0	118	16.5	
B 2368-13	20	43.5	118	18.7	Red
B 3428-41	20	30.5	90	18.2	
B 2162-36	20	-	111	-	
B 3454-14	20	10.0	104	15.7	Red

continued

California table 4, continued.

Kind	Seed pieces per replicate	Yield	Days from planting to death of vines	Solids	Remarks
	No.		No.	Pct.	
A 180-25	20	38.5	118	17.9	
B 3126-16	15	30.5	132	19.7	
B 3200-2	15	28.0	139	19.7	
B 3200-4	15	27.5	118	16.7	
B 3199-19	15	27.5	132	21.4	
B 3189-6	15	21.0	125	19.9	
A 167-3	15	25.5	125	17.4	
A 183-8	15	16.0	125	17.9	
A 330-4	15	28.0	139	18.2	
A 223-67	15	22.5	139	18.9	
A 117-51	15	24.5	125	17.4	
A 179-13	15	29.0	139	17.7	
A 246-35	15	18.0	125	16.5	
A 180-27	15	23.5	111	17.9	
A 183-5	15	22.0	132	-	
A 116-58	15	32.5	139	17.9	
A 180-30	15	23.0	132	18.2	
A 115-9	15	28.5	132	19.9	
A 102-18	15	27.5	139	21.1	
A 120-5	15	22.5	125	19.7	
A 150-53	15	36.5	125	18.7	
A 180-24	15	28.4	111	16.5	
A 244-4	15	26.5	132	20.2	
A 170-5	15	36.0	118	18.4	
A 167-6	15	25.5	125	18.9	
A 173-3	15	29.5	111	15.8	
A 180-2	15	26.5	111	17.2	
A 170-1	15	43.3	125	17.9	
B 3454-5	20	34.5	111	18.7	
B 2922-26	20	29.5	97	16.5	

Size of plot 1/20 acre.

Fertilizer 16-20-0 at 600 pounds per acre.

Damage from mice was so extensive in the Siskiyou county plot at Tulelake, that the data were considered insignificant and the plot was abandoned.

Seven named varieties and eighteen U.S.D.A. seedlings were indexed in the greenhouse in artificially inoculated soil for resistance to two species of nematodes. All were found to be quite susceptible. The data are presented in California table 5.

California table 5. Test for resistance to two species of nematodes, 1957.

Kind	<u>Meloidogyne</u>	<u>Meloidogyne</u>
	<u>javanica</u>	<u>incognita</u> var. <u>acrita</u>
Tawa	S	S
Merrimack	S	S
Keswick	S	S
Plymouth	S	S
Menominee	S	S
White Rose	S	S
Russet Burbank	S	S
B 3944-4*	S	S
B 3944-11*	S	S
B 3945-12*	S	S
B 4002-1*	S	S
B 4004-63*	S	S
B 3457-2	S	S
B 2162-36	S	S
B 2368-13	S	S
B 2874-4	S	S
B 2922-26	S	S
B 3140-36	S	S
B 3319-30	S	S
B 3427-7	S	S
B 3428-20	S	S
B 3428-41	S	S
B 3453-2	S	S
B 3454-5	S	S
B 3454-14	S	S

* These lines are resistant to Golden nematode.

S = susceptible.

CONNECTICUT
Arthur Hawkins

Two potato variety tests were conducted by the Storrs Agricultural Experimental Station, Storrs, Conn., in the Connecticut River Valley in Connecticut in 1957. The driest season on record occurred in Conn. and it was especially dry in the area where the variety tests were grown. Good yields were obtained at the location where irrigation was used. In the test where irrigation facilities were not available, yields of only 200 bushels per acre or less were obtained.

Experimental procedures and shape of tubers at the location where good yields were obtained with irrigation are indicated in Conn., table 1 of yield and dry matter.

Conn., table 1. Yield^{1/} and specific gravity of potato varieties and seedlings, Windsorville, Conn., 1957.

Variety or seedling ^{2/}	Total yield per acre	Yield per acre, over 1 7/8"				Total solids
		Free of serious off shape ^{3/}				
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
(9" spacing except*)						
Boone	399	95.9	383	94.4	377	17.5
Green Mountain	335	93.5	313	92.3	309	20.4
Houma (15")	404	92.2	372	90.1	364	18.7
Huron (12")	412	94.7	390	88.9	366	20.4
Katahdin	317	92.6	297	93.6	297	19.1
Onaway	273	88.9	243	88.9	243	17.2
Plymouth	227	93.7	213	93.4	212	16.9
Saranac (15")	375	85.7	321	85.2	319	19.1
Tawa	252	92.8	234	92.3	233	18.3
B69-16	307	94.8	291	93.5	287	19.1
B962-3	188	83.7	157	83.7	157	20.6

1/ Plots: 1 row 21 feet long. Replication: 4, in 4 randomized blocks (3 sections x 4 rows). No sprayer - wheel damage. Soil: Hartford fine sandy loam; potatoes previous year. Fertilizer: 2,200 pounds 6-8-8 in row side bands plus 30 pounds N broadcast. Season and conditions: planted 5/10/57. Dry season, irrigation used. Some aphid injury until controlled 8/1, again 8/30. On 8/30 Onaway and Tawa about gone; Plymouth dead. On 9/20, fleabeetle injury to Saranac about 30% still green.

2/ Seed supplied from Presque Isle, Maine through cooperation of R. V. Akeley, USDA, except Huron from Canada; Onaway and Tawa from Michigan.

3/ Tuber observations: Boone - medium smooth oval shape shallow eyed, some with deep blossom-end eye. Huron - very irregular, deep blossom-end eye, some growth cracks; Onaway - very irregular shape; Plymouth - fairly good shape. B 69-16 - fairly good shape, some had typically Green Mountain shape.

DELAWARE

E. P. Brasher and J. T. Waddington

Yield and Solids Tests of Varieties and Seed-Source Study of Delus

In this study 16 varieties and seedlings and three sources of Delus seed were tested. The sources of Delus seed were: Maine, home-grown early (planted in April, harvested in August), and home-grown late, (planted in June, harvested in October).

The experimental conditions and procedure were as follows:

Location: Univ. Farm, Newark	Planting date: April 1
Seed Source: Maine and home-grown	Fertilizer: 2400 lbs. 8-12-12
Soil: Sassafras loam	per acre in bands at plant-
Previous Crop: Potato	ing time
Plot size: 3' x 25' (29 seed pieces	Fungicide: Zineb
per 25-foot row)	Harvesting date: August 20
Plot design: Randomized block	Growing conditions: Driest on
	record
	Irrigation: None

Delaware, table 1. Variety yield test and seed-source study of the Delus variety, Newark, Del., 1957

Variety	Seed Source	U.S.No.1 yield per acre		Solids
		Cwt.	Pct.	Pct.
Delus	Maine	139	94.1	19.4
Saco	"	136	78.2	17.4
Katahdin	"	123	87.5	15.7
Pungo	"	119	84.3	17.7
Cherokee	"	118	79.2	18.9
B3453-2	"	108	77.4	16.5
Tawa	"	107	82.7	18.9
Irish Cobbler	"	96	78.7	18.9
Merrimack	"	94	85.4	16.7
Boone	"	87	77.3	14.1
Delus	(Home-grown, late)	82	88.4	18.4
B3428-20	Maine	80	79.9	18.7
B920-7	"	76	71.8	18.7
B3454-5	"	71	64.1	15.3
Delus	(Home-grown, early)	69	84.7	18.4
B607-56	Maine	63	80.3	15.4
B3427-7	"	58	53.7	18.4
B595-76	"	36	66.0	16.5
L.S.D. - 5% level		20	---	0.7
L.S.D. - 1% level		27	---	0.9

The results of these tests (Table 1) show that Delus, Saco and Katahdin were the most productive of the varieties and seedlings tested. Among these varieties there was no significant difference in yield of U.S.No.1 tubers. Delus, however, ranked first in yield of U.S. No. 1 tubers, percentage of No. 1 tubers and in total solids. Delus, from home-grown seed performed very poorly.

Size and Shape of Delus Seed Pieces

The experimental procedure and conditions for this study were similar to those described for the variety trial except that the potatoes were grown under irrigation on a Norfolk sandy loam soil in three-row instead of one-row plots. Only the center rows were harvested for records. The various treatments and results are shown in Table 2.

Delaware table 2. Effect of size and shape of Delus seedpieces on yield.

Treatment	Yield Per Acre		U.S.No.1
	U.S.No.1	Total	
	Cwt.	Cwt.	Pct.
1-oz. pieces cut from 2-oz.potatoes	218	224	97.3
3/4-oz.pieces cut from 3-oz.potatoes	196	207	94.6
1½-oz. pieces cut from 3-oz.potatoes	209	221	94.6
1-oz. pieces cut from 4-oz.potatoes	210	222	94.6
2-oz. pieces cut from 4-oz.potatoes	204	216	94.6
1½-oz. pieces cut from 6-oz.potatoes	202	215	94.0
3-oz. pieces cut from 6-oz.potatoes	238	249	95.6
1-oz. pieces cut from 8-oz.potatoes	192	199	96.5
2-oz. pieces cut from 8-oz.potatoes	211	220	95.9
L.S.D. - 5% level	25	23	---

A study of the data reveals that wide yield differences do not exist. Although the three-ounce seedpieces produced the greatest yield, the one-ounce pieces cut from two-ounce potatoes were the most economical. At the spacing employed (10" x 34") 34.6 cwt. of three-ounce seedpieces would be required to plant an acre, while only 11.5 cwt. of one-ounce seed would be required. With seed potatoes selling at \$4.00 per cwt. and market potatoes at \$3.00, a greater net return would be obtained from the one-ounce seedpieces.

In this study not all of the one-ounce pieces performed alike. The yields from one-ounce seedpieces cut from 2, 4, and 8-ounce potatoes were 218, 210, and 192 cwt. per acre, respectively. Two factors may have contributed to these yield differences. First, the area of cut surface on the one-ounce pieces from 2-ounce potatoes was much less than on the one-ounce pieces cut from 4 and 8-ounce potatoes. Second, the pieces from the smaller potatoes had more eyes which may have contributed to the larger yield.

In various potato trials it has been noted that the Delus variety sets fewer tubers per plant than most varieties. With this condition existing it seemed possible that a closer spacing of the variety might materially increase yields. Spacing trials were, therefore, conducted in 1957 using 6, 8, 10 and 12-inch spacings in rows 34 inches apart. Three-row plots, 25 feet long were employed but only the center rows were used for records. The plots were irrigated whenever the available moisture in the soil reached 50 percent. Other experimental conditions and procedures were similar to those described for the variety trials.

Delaware table 3. Results of potato spacing trials.

Spacing	U.S. No. 1	Total Yield	U.S. No. 1
	per acre	per acre	Pct.
	Cwt.	Cwt.	
6" x 34"	310	329	94.2
8" x 34"	225	237	94.9
10" x 34"	198	211	93.8
12" x 34"	187	197	94.9
L.S.D. - 5% level	36	36	----
L.S.D. - 1% level	50	49	----

The results (Table 3) show that the 6" x 34" spacing was far superior to any other spacing tested.

Yield and Solids of Delus

This experiment was designed to test the effects of various treatments on yield and solids of Delus. The experimental procedure and conditions were the same as described for the variety trials except that 1400 lbs. per acre of a 8-12-12 fertilizer was used. The potash in this fertilizer was derived from K_2SO_4 unless otherwise stated. The treatments and their resulting yields and solids appear in Table 4. No treatment significantly increased yield over the check. All of the Gibberellic acid treatments, however, significantly reduced yields. Also no significant differences existed between the check and other treatments in solid content.

Delaware table 4. Effect of various treatments on yield and total solids of Delus potatoes.

Treatment	U.S.No. 1 Yield per Acre		Solids
	Cwt.	Pct.	
Versene Iron Chelate, 25 lbs. per acre in soil before planting	162	93.5	20.7
Maleic Hydrazide (MH-40), 7 lbs. in 150 gallons of water per acre	149	94.8	20.8
Magnesium Chelate, three foliar sprays at rate of 2 lbs. per 100 gallons	154	93.2	19.9
Vine cut 7 days before harvest	136	93.4	19.9
Potash from Kcl	150	93.6	19.5
200 lbs. per acre of Ammonium nitrate, sidedressed	160	95.4	20.1
Sodium arsenite applied to vines 7 days before harvest	138	94.9	20.4
Gibberellic acid, foliar spray at 100 p.p.m.	87	69.5	21.1
Gibberellic acid, foliar spray at 50 p.p.m.	85	70.8	20.7
Gibberellic acid, seed treatment at 1 p.p.m.	115	76.6	19.9
Check	151	95.2	20.5
Versonal powder, 12 lbs. per acre in soil before planting	165	95.0	20.8
L.S.D. - 5% level	28	---	1.0

FLORIDA (Hastings)

A. H. Eddins

Reaction of Potato Varieties and Seedling Selections to Corky Ringspot

Nine potato varieties and seven USDA seedling selections were planted on January 4 in 32-hill plots in soil infected with corky ringspot and the tubers were dug and examined for corky ringspot symptoms April 11. None of the disease appeared in any of the varieties and selections including susceptible Sebago.

In another location not previously known to be infested with corky ringspot, percent tuber infection in Kennebec, Red Pontiac and Sebago was 55.4, 69.1 and 74.0, respectively.

Potato Variety and Seedling Selection Trials in 1957

E. N. McCubbin and A. H. Eddins

In 1957, 11 potato varieties and 14 USDA seedling selections were grown and compared for yield and other characteristics at the Potato Investigations Laboratory. Seed of Red Pontiac and Kennebec was obtained from two sources, Maine and Virginia; while seed of Sebago was obtained from three sources, Maine, Virginia and Canada. This made a total of 29 potato seed stocks in the trial and they were planted January 8, 1957.

No frost damage occurred after the potato plants emerged, but the growing season was exceptionally dry until about three weeks before harvest on April 15, 1957. Potato plots were irrigated by the water furrow method to supply moisture during dry weather.

Red Pontiac seed from Maine produced the largest yield, Fla. table 1. It significantly outyielded the Red Pontiac seed from Virginia. There were no significant differences in the yield of the three seed stocks of Sebago nor in the two seed stocks of Kennebec. For each of these varieties, however, the Virginia seed tended to outyield the Maine seed. Plants of Sebago seed from Virginia attained full bloom earlier than did those plants from the Sebago seed from Maine and Canada.

Two USDA seedling selections, B3725-1 and B3602-4, produced yields equal to or superior to those of Sebago, the standard variety at Hastings. Their tubers were excellent in appearance and they will be tested further. Six varieties and 10 USDA seedling selections yielded significantly less than Sebago.

Fla. Table 1 -- Results of Potato Variety and Seedling Selection Test at Hastings, Fla. in 1957

Variety or Selection <u>1/</u>	Stand <u>2/</u> Pct.	Yields per acre	
		U.S.No. 1A Cwt.	U.S.No. 1A + 1B Cwt.
Red Pontiac (M)	100	260	280
B 3725-1	100	233	243
Sebago (Va.)	100	222	235
B 3602-4	98	215	240
Sebago (Ca.)	95	209	224
Merrimack	98	204	217
Red Pontiac (Va.)	100	202	227
B 3692-4	100	188	214
Pungo	100	186	202
Kennebec (Va.)	100	177	187
B 2368-13	100	176	206
Sebago (M)	98	174	200
Kennebec (M)	92	170	183
B 2368-4	95	170	188
Plymouth	93	157	169
B 929-23	88	165	192
3674	88	156	180
2988	81	136	148
3769	83	136	155
Delus	93	125	134
Saco	97	125	143
Boone	67	121	133
B 3010-4	100	118	143
Cherokee	98	109	130
B 595-76	82	108	127
6059	90	100	122
5347	83	85	99
B 2922-26	98	80	118
LaSoda	88	71	87
L.S.D. 5%		51	49
1%		68	65

1/ Each potato variety or seedling selection planted 8 inches apart in 25-foot single row plots January 8, 1957 and replicated 5 times.

2/ Stand recorded 30 days after planting.

Recovery from Frost Damage in 1957

E. N. McCubbin

Another potato variety trial included the planting of 3 to 14 seedpieces of 13 USDA potato varieties and 46 seedling selections to determine their ability to survive or recover from frost damage and to produce potatoes. Seed of all stocks were treated with ammonium thiocyanate to break dormancy and planted December 17, 1956. The temperature was falling on January 18, 1957 and stands of plants were recorded; severe frost occurred that night and killed all above-ground plants to the soil surface. Most plants of most varieties and seedling selections recovered in about 3 weeks and produced plants of normal appearance.

The potatoes were dug April 12, 1957, 116 days after planting and the number and weight of U.S. No. 1A and U.S. No. 1B potatoes recorded for each lot of seed planted, Fla. table 2.

Two varieties, Redbake and Merrimack, and 9 seedling selections recovered from frost damage and produced a larger yield of potatoes per hill than did Sebago. Their yields ranged from 1.8 to 2.2 pounds per hill as compared to 1.7 pounds per hill for Sebago. Two varieties, Pungo and Saranac, and two seedling selections, 191-50-1 and B3626-15, produced yields equal to that of Sebago. LaSoda and six seedling selections produced less than one pound of potatoes per hill. One seedling selection B3629-11 failed to grow at all.

Results of this trial indicate that some potato varieties and seedling selections possess the ability to recover from frost damage and produce good yields of potatoes, while other varieties and selections do not possess this characteristic. The study will be continued.

Fla. table 2. - Recovery from frost damage and yields of 59 potato varieties and seedling selections grown at Hastings, Fla. in 1956 and 1957.

Variety or Selection	No. Seed Pieces Planted ^{1/}	Plants Emerged 1/18 ^{2/}	Hills Dug	US 1A+1B Per Hill	Tubers Per Hill
	No.	No.	No.	Lbs.	No.
B 3692-4	4	4	4	2.2	5
B 929-23	3	2	3	2.2	10
B 2368-4	4	3	4	2.2	6
B 3777-1	6	3	6	2.1	7
156-48-2X	4	4	4	2.1	6
B 355-35	5	4	5	2.0	6
Redbake	4	4	4	2.0	7
3674	9	6	6	1.9	6
83-49-1	4	2	4	1.8	8
215-50-2	5	5	5	1.8	4
Merrimack	3	1	3	1.8	4
Pungo	3	3	3	1.7	4
191-50-1	4	4	4	1.7	8
Sebago	14	13	14	1.7	6
Saranac	7	7	7	1.7	7
B 3626-15	5	4	5	1.7	6

continued

Fla. table 2, continued

Variety or Selection	No. seed Pieces Planted ^{1/}	Plants Emerg'd 1/18 ^{2/}	Hills Dug	US 1A+1B Per Hill	Tubers Per Hill
	No.	No.	No.	Lbs.	No.
B 2938-22	6	4	6	1.6	7
B 3595-5	4	3	4	1.6	9
OB 2905-1	8	8	8	1.6	6
B 3557-32	4	4	4	1.6	5
B 3397-17	6	4	6	1.5	5
Plymouth	4	4	4	1.5	3
B 137-5	6	4	5	1.5	3
B 3413-7	3	1	1	1.5	5
B 2368-13	4	4	4	1.5	5
Delus	4	0	4	1.5	4
Kennebec	4	2	4	1.5	4
82-49-1X	7	7	7	1.5	6
B 3602-4	5	5	5	1.5	4
315-48-3X	5	5	5	1.4	5
B 3725-1	6	4	6	1.4	5
Cherokee	5	5	5	1.4	4
47156	7	7	7	1.4	3
B 595-76	5	3	4	1.4	6
Boone	7	2	6	1.3	5
B 294-65	5	4	5	1.3	5
B 3309-2	3	0	3	1.3	6
B 3010-4	3	3	3	1.3	5
6059	6	3	2	1.3	5
2988	7	1	2	1.3	3
93-48-1	5	5	5	1.2	6
B 2971-14	6	5	5	1.2	7
B 3331-7	7	4	7	1.2	5
5347	6	3	4	1.2	7
B 3627-18	4	4	4	1.2	6
Menominee	8	8	8	1.1	4
Saco	4	4	4	1.1	4
3769	8	8	8	1.1	6
B 1339-12	6	6	6	1.1	4
B 2922-26	3	3	3	1.0	5
B 3391-2	4	4	4	1.0	5
B 926-9	8	8	8	.9	4
3633	6	3	3	.8	4
B 3556-12	4	3	3	.8	6
B 3400-1	6	3	5	.7	3
B 607-56	7	6	6	.7	5
LaSoda	7	7	6	.5	5
B 922-6	7	7	7	.5	3
B 3629-11	5	0	0	.0	0

^{1/} Three to 14 seedpieces of each variety or seedling selection planted 12/17/56.

^{2/} Plant stands recorded 1/18/57 just before a killing frost that night.

IDAHO (Aberdeen)
Darrel R. Bienz

Yield and solids content of six numbered selections from the U.S.D.A. Western Regional Potato-Breeding Program were compared with the yield and solids content of Russet Burbank and Early Gem in 1956. Yield and solids of five U.S.D.A. selections were compared with Russet Burbank and Early Gem in 1957.

The potatoes were grown on Declo silt loam soil under irrigation. In 1956 each plot consisted of one 32-foot row. The experiment was replicated five times and seedpieces were planted approximately ten inches apart. In 1957 a Latin-square split-plot design was used in order to test the effect of different spacings within the row on the performance of the various varieties. Each variety plot consisted of three 27-foot rows. Seedpieces were planted about eight inches apart in one row of each plot, about ten inches in the second and about thirteen inches in the third. Rows were spaced 36 inches each year and at the time of planting each year a sidedressing of ammonium-sulfate phosphate at the rate of about 60 pounds of N₂ and 75 pounds of P₂O₅ per acre was applied.

Stands were good in 1956. In 1957 it was necessary to plant seed grown in the 1956 trials for the selections A170-9, A180-26 and A223-21. This along with the wet spring and delayed planting caused considerable blackleg and seedpiece decay to develop in these varieties. In addition about 35 percent of the plants in the A170-9 plots were affected with leafroll so, especially for this last named selection, yield was undoubtedly decreased from what would be expected normally. Plots were planted on May 17 in 1956 and on May 24 in 1957 and were harvested on September 26 in 1956 and on September 27 in 1957.

The performance of these varieties for these two years is shown in Bienz tables 1 and 2.

Bienz table 1. Comparison of eight varieties of potatoes for yield, grade and quality at Aberdeen, 1956.

Variety	Production index	Total yield	Yield U.S. #1	10 oz. and over	Dry Matter
	Sx/A	Sx/A	Sx/A	Sx/A	pct.
A 120-5	263	295.4	86.2	3.6	21.2
A 180-26	380	280.4	168.7	35.4	20.5
A 183-8	386	259.1	181.5	25.9	21.6
A 183-11	223	142.9	105.3	15.4	21.8
A 223-21	369	279.5	161.5	38.6	20.4
A 170-9	427	310.8	185.6	106.6	20.5
Early Gem	482	300.8	226.8	68.1	18.9
Russet Burbank	428	304.0	194.2	56.3	21.8
L.S.D. .05	83.0	53.7	39.1	24.6	
L.S.D. .01	112.5	72.7	53.0	33.3	

Bienz table 2. Performance of potato selections and varieties at Aberdeen, 1957.

Variety	Stand Count	Total Yield	: U. S. No. 1's :		Mal- formed	Dry Matter	
			: Total :	: 10 oz. and over:			
			Sx/A	Pct.	Sx/A	Pct.	
A 170-9 ^{2/}	162 ft.	Sx/A	Sx/A	Pct.	Sx/A	Pct.	
	200	217	116	25.8	49.9	21.4	
	183	198	99	13.7	43.0	21.5	
	<u>149</u>	<u>206</u>	<u>101</u>	<u>30.1</u>	<u>48.0</u>	<u>21.4</u>	
Average	177	207	105	23.4	47.0	21.4	
A 180-26	200	241	126	18.2	74.5	19.9	
	173	219	119	22.7	57.6	19.8	
	<u>153</u>	<u>211</u>	<u>113</u>	<u>26.4</u>	<u>63.0</u>	<u>19.4</u>	
	Average	175	224	119	22.3	65.0	19.7
A 223-21	195	207	176	29.1	2.1	20.4	
	171	203	175	30.2	2.0	19.4	
	<u>140</u>	<u>163</u>	<u>141</u>	<u>31.8</u>	<u>1.9</u>	<u>18.9</u>	
	Average	169	191	164	30.2	2.0	19.6
A 175-7	231	332	270	43.3	29.5	18.4	
	197	291	234	51.7	34.1	19.8	
	<u>167</u>	<u>276</u>	<u>219</u>	<u>47.1</u>	<u>37.9</u>	<u>18.9</u>	
	Average	198	300	241	48.3	33.8	19.4
Early Gem	215	231	182	20.3	21.6	16.9	
	186	217	178	28.2	17.7	17.2	
	<u>165</u>	<u>206</u>	<u>169</u>	<u>31.1</u>	<u>21.6</u>	<u>17.1</u>	
	Average	189	218	176	28.3	20.3	17.1
Russet Burbank	220	284	188	21.7	45.5	20.5	
	191	250	163	23.7	46.9	20.7	
	<u>163</u>	<u>239</u>	<u>167</u>	<u>24.0</u>	<u>39.7</u>	<u>20.4</u>	
	Average	191	258	173	23.1	44.0	20.5
Average for Spacing	Average	Closest	248	176	29.9	32.2	19.6
		Medium	230	161	31.3	33.6	19.6
		Widest	217	152	33.1	35.0	19.4
L.S.D. Variety Aver- age	.05	25	26	9.4	21.9		
	.01	35	35	12.9	29.8		
L.S.D. Spacing Aver- age	.05	9	8	N.S.	N.S.		
	.01	12	12	N.S.	N.S.		

^{1/} Includes knobby, pointed ends, and growth cracks.

^{2/} See text for an explanation of the reason for lowered yield for this variety.

INDIANA

H. T. Erickson

A number of crosses were made in the spring of 1957. The seedling, Wis. 0112.51 was used intensively as a parent because of its generally good performance under Indiana conditions. Seed from these crosses were planted in the fall.

Further screening of potential parental material was conducted. Lines carried over from the previous year were planted in single 25-hill rows and dry-matter content and yield data were obtained. General horticultural type and scab susceptibility were also considered. Those lines surviving the second year's screening are given in Indiana table 1. A number of these will be used as parents in forthcoming crosses. All have one or more desirable traits.

In addition, named varieties and plant introductions of S. andigenum and S. rybinii are to be used in future crosses.

One thousand seedlings were grown in single hills during the summer. Twenty-two selections were made from this group and will be planted on the Muck Crops Farm in 1958.

Nine seedlings were saved for further observation (from ten and 25 hill plantings). Some of these are ready to go into replicated yield trials.

Indiana table 2 summarizes results of a seedling-variety yield trial of 18 entries. They were grown on muck soils at Walkerton, Indiana. Eleven hundred pounds of 5-20-20 was applied in the row at planting. A weekly spray schedule was followed and vines were killed by frost.

Ind. table 1. Potato accession of possible parental value. Yield, total solids and percent U. S. No. 1A tubers. Single 25-hill plot.

Selection	Source	Yield	% "A" Size	Dry
		(25 feet of row)		Matter
		Lb.	Pct.	Pct.
1. B3391-6	USDA	85.4	85.2	18.3
2. B3428-20	"	47.1	89.4	17.0
3. 96-28	"	74.5	95.8	17.7
4. B3629-4	"	31.8	71.8	16.8
5. B3391-17	"	89.5	86.5	17.5
6. X792-76	"	81.7	79.2	16.6
7. 1711-9	N.B.	70.6	89.4	18.5
8. Col. 12,240	Colo.	43.8	79.4	16.6

Ind. table 2. Yields of advanced seedlings together with dry-matter content.
Four replicates of 25 hills. Walkerton, Indiana 1957. Muck soil.

Variety	Yield	U.S. No. 1A	Specific Gravity	Total Solids
	Cwt.	Pct.		Pct.
1. Red Pontiac	878.4	94.5	1.061	16.2
2. Ontario	535.0	84.6	1.064	16.9
3. N.D. 2911-IR	533.4	93.9	1.068	17.7
4. Katahdin	532.8	93.6	1.068	17.7
5. Redbake	447.6	80.0	1.066	17.3
6. I1037-1	440.4	87.3	1.069	17.9
7. 33106-4	423.0	94.8	1.070	18.1
8. 2475-8	416.4	86.1	1.066	17.3
9. ND2906-IR	370.8	83.1	1.057	15.4
10. BE 2332-27	366.0	86.9	1.070	18.1
11. I911-2	337.2	80.5	1.065	17.0
12. Wis 1429	322.2	92.6	1.070	18.1
13. I1089	310.2	92.5	1.066	17.3
14. Wis 0112.51	299.4	79.5	1.074	18.9
15. BE2335-42	298.8	77.4	1.068	17.7
16. I911-7	264.0	85.6	1.066	17.3
17. I1129-4-1	236.4	83.9	1.070	18.1
18. I902-2	97.2	73.5	1.060	16.0
L.S.D.	102.0			
C.V.	18.13%			

IOWA
August E. Kehr^{1/} James C. Horton^{2/} Edwin T. Hibbs^{3/}
Lind Sanford^{4/} and Frank Manzer^{5/}

The potato improvement project as conducted in Iowa is a cooperative program between the U. S. Department of Agriculture and the Department of Horticulture at Iowa State College in the breeding phases and the Department of Plant Pathology at Iowa State College in the disease phases. In 1957 some additional cooperative work on breeding for insect resistance was initiated with the Department of Zoology and Entomology at Iowa State College.

Seed and Seedling Production. Crosses for the potato program are made in the greenhouse during February to April. By using artificial lights and heat controls we can duplicate field conditions of temperature and light. Both blooming and seed set are exceptionally good. Parents were selected and crosses made based upon the following objectives in the order given: (1) High yields, (2) High quality (interior color, high solids, texture, etc.) (3) Scab resistance, (4) Other diseases.

Crosses made in the greenhouse include resistance to scab, late blight, virus X, leaf roll, verticillium wilt, ring rot, virus A, and virus Y. Seed production was excellent and a total of 479 combinations were made with several million seeds produced in total.

A total of about 30,000 seedlings were grown and planted at Clear Lake. From these about 400 single-hill selections were made for further testing. In addition to our own seedling tubers, lines were received from cooperators as follows:

<u>Cooperator</u>	<u>No. of Progenies</u>	<u>Est. No. of Seedlings</u>
W. C. Edmundson, Colo.	43	5000
F. J. Krantz, Minn.	54	4500
R. V. Akeley, U.S.D.A.	29	4200
W. G. Hoyman, N. D. & U.S.D.A.	13	500
Robert Johansen, N. D.	31	2500
Robert L. Flaisted, N. Y.	100	3000

It is of interest to note that identical plantings of part of our seedling population were made at Clear Lake and Ithaca, New York. From our plantings 56 selections were made, as compared to over 400 made in New York State. We have no explanation other than the fact that we have conditions which enable us to select for scab resistance simultaneously with appearance. In addition perhaps we have climatic conditions which are less favorable for potato production which means fewer adapted varieties.

- ^{1/} Professor of Horticulture and Horticulturist, Iowa A.E.S. and U.S.D.A.
- ^{2/} Assistant Professor of Plant Pathology, A.E.S.
- ^{3/} Associate Professor of Entomology, Iowa A.S.S.
- ^{4/} Graduate Assistant, Horticulture
- ^{5/} Graduate Assistant, Plant Pathology

Increase Plots. Our isolation plots were planted at Northwood, N. D. under the able supervision of Dr. W. G. Hoyman, who cultivates, sprays and rougues these plots for virus diseases. Every tuber planted at Northwood is indexed in our greenhouses at Ames, and all are planted in tuber units. This procedure is necessary so that we may maintain disease-free stock for distribution and further increase. In 1957 a total of 540 lines were increased and maintained at Northwood. Our seed pieces at Clear Lake were all treated in a streptomycin-captan dust to prevent seed piece decay. This treatment has also given us increased vigor in our Northwood plots where the seed pieces are cut several weeks in advance of planting.

3-Hill Tests. Early generation material is planted in these tests. These are observed for various characteristics including vine type and vigor, maturity, general appearance, specific gravity, scab resistance, internal defects, external defects, flesh color, and texture. Many selections are discarded in these tests. There were 182 entries in 1957. The best from this test are planted in the 25-hill test.

25-Hill Tests. These tests advance the information on new lines over that of the previous 3-hill test. In addition, yield data are taken in these plots. The yield data as shown in Iowa table 1, are only for comparison purposes and must be interpreted liberally. The top yield of 1152 bushels is not a true picture of what selection B 3511-17 would do in a fully replicated trial. However, selections which are out-standing in the 25-hill tests are put in the regular yield trial the following year.

Iowa table 1. 25-Hill potato yield trials, Clear Lake, 1957.

Variety	Color	Maturity	Total Yield P/A.1	Yield U.S. No.1 P/A.	Total Solids	Scab		Remarks
						Area	Type	
			Bu.	Bu.	Pct.			
B3511-17	W	L	1152	1149	11.8	1	3	Rough, deep eyes, dull skin.
B 3576-22	W	E	1084	892	16.0	3	2	Smooth, small.
Essex	W	ML	972	900	15.0	1	4	Rough, dull appearance.
B 3641-18	W	M	946	871	16.5	T	2	Nice skin and shape.
3 WM-19	W	E	907	875	16.7	T	3	White skin, some-pointed.
B 3821-Ia 2	W	M	902	810	16.7	4	3	Long white
B 3604-13	W	ME	866	844	15.6	T	2	Flat, sl. russet.
I 8168-1	W	M	837	808	15.6	2	3	Fair shape.
Neb. 154-47-1	L	R	825	685	14.8	T	3	Deep apical ends.
B 2067-52	L	W	799	758	13.9	T	3	Smooth, white skin.
Boone	L	W	797	712	18.4	3	2	White skin, deep eyes.
I 1363-1	ME	W	794	749	15.8	3	3	Deep eyes, sl., flat.
B 2068-23	W	L	872	809	14.1	3	3	Scabby, dull skin

continued

Iowa table 1 continued.

Variety	Color	Maturity	Total Yield P/A. L.	Yield U.S. No. 1 P/A.	Total solids	Scab		Remarks
			Bu.	Bu.	Pct.	Area	Type	
I 1037-1	M	W	788	712	15.6	2	3	Fair shape, dull skin.
Cobbler	E	W	787	760	17.3	T	5	---
B 3309-4	R	M	771	594	13.5	4	2	Internal Red.
I 1193-1	E	W	749	730	16.5	T	3	Round, flat, dull skin.
B 3605-17	M	W	747	634	14.5	3	2	Smooth, flat.
Nordak (10)	E	W	741	725	16.0	T	5	Nice type.
B 3584-5	ML	W	725	689	15.4	3	2	White skin, smooth small.
Picha 40	E	R	719	657	15.8	T	5	Russet, dull red.
B 3403-10	E	W	711	658	16.2	1	3	Flat, shallow eyes.
B 929-23	Rus.	L	689	606	16.5	3	3	Flat.
X 26-8	ML	R	683	543	16.0	T	2	Small, rough
B 3605-33	ME	W	681	637	15.4	2	1	Nice white skin, sl. long.
I 913-2	W	M	676	657	15.0	2	3	Somewhat deep eyes.
L 1019-7	W	L	672	635	13.7	2	2	Sl. russet, sl. flat.
B 3114-6	W	ML	660	600	13.5	3	3	Poor appearance.
I 1049-3	R	L	658	566	16.5	4	3	Badly scabbed.
I 1092-2	W	ML	651	630	15.0	2	2	Brn. skin, nice shape.
B 605-10	W	ME	643	623	16.2	T	3	Flat.
Pungo	W	L	636	612	17.1	3	2	Cobbler type.
La. 6279	R	ML	634	544	13.9	3	1	Smooth, nice red.
Ti.-5	W	L	632	583	14.8	1	1	Flat, pointed, white skin.
I 1211-1	W	ML	629	614	15.0	1	1	Flat, deep eyes.
Pentland Ace	W	ML	627	448	19.2	1	2	Smooth, heavy skin.
B 3097-16	W	ME	624	599	16.5	1	3	Flat, dull skin.
B 3428-41	W	M	624	548	16.5	T	3	Dull skin, fair shape.
Neb. 215-50-2	R	ML	620	579	23.3	1	5	Russet red, long.
B 579-3	W	L	619	552	13.5	2	4	Dull skin, growth cracks.
B 3602-1	W	M	609	583	14.8	T	5	Dull skin.
3 XX-1	W	ML	604	484	13.3	T	2	Watery interior.

continued

Iowa table 1 continued.

Variety	Color	Maturity	Total Yield P/A. L.	Yield U.S. No. 1 P/A.	Total solids	Scab		Remarks
			Bu.	Bu.	Pct.	area	type	
B 3124-Ia.3	W	L	601	561	15.4	T	3	Bright white skin.
41956	W	L	594	436	14.8	T	4	- - - - -
Earlaine	W	E	591	539	14.8	T	5	- - - - -
R. Burbank	Rus.	L	586	480	16.5	2	2	- - - - -
I 781-7	W	ML	583	565	17.1	1	1	Very scab res.
1 1107-3	W	ML	582	549	14.8	1	2	Bright skin, smooth.
B 2340-2	R	L	575	538	15.0	3	2	- - - - -
La. 3769	W	M	572	516	13.5	2	4	- - - - -
B 2894-24	W	L	571	560	13.5	T	4	Deep eyes, fair skin.
B 3602-7	W	L	564	503	15.6	3	3	Dull skin.
CS 9947	W	L	562	521	14.8	4	2	Dull skin, ir- regular shape.
CS 12240	W	L	560	396	14.5	1	3	Small, dull skin, sl. russet-discard
B 3603-5	W	ML	555	436	15.2	3	2	- - - - -
B 3672-3	W	L	544	443	16.9	T	3	Very irregular shape, white skin.
Chippewa	W	ME	533	503	13.9	1	4	White skin.
I 1182-1	W	L	529	489	18.0	3	3	Nice shape, sl. russet, smooth.
1682-C	W	M	527	471	14.1	T	3	Sl. Russet, point- ed.
White Rose	W	L	511	459	15.2	2	2	Pointed, deep eyes, long white.
I 1034-5	W	E	487	428	14.8	2	3	Dull skin.
B 3712-4	W	E	482	376	16.7	2	1	Bright, white skin, sl. flat.
Redkote	R	L	474	381	14.1	1	3	Smooth, russet red.
I 1027-18	R	L	466	423	15.8	2	3	Deep eyes.
B 3401-20	W	ME	463	449	14.8	3	3	Very scabby, flat.
I 872-4	W	M	454	451	16.7	1	3	Very nice shape, smooth, very nice.
3 XE-1	W	ME	439	443	16.7	3	2	Deep eyes.
B 3648-4	W	E	430	367	15.6	T	4	Alligator skin, smooth, nice shape.
B 3452-15	R	E	423	385	15.4	1	3	Nice shape, semi- russ. red.
3 RC-8	W	ML	417	317	17.1	T	3	Flat, bright skin
B 3599-11	W		400	295	12.7	3	3	Scabby - discard
B 3603-15	W	E	385	257	14.1	2	3	Small dull skin
B 96-56	W	E	370	335	16.2	T	3	Somewhat deep eyes.

continued

Iowa table 1 continued.

Variety	Color	Maturity	Total yield P/A. 1/	Yield U.S. No. 1 P/A.	Total solids	Scab		Remarks
						Area	Type	
			Bu.	Bu.	Pct.			
B 3131-8	R	L	357	299	16.9	1	2	- - - - -
B 2162-32	R	E	342	254	16.2	2	1	Off type red, small.
I 1107-2	W	E	319	216	14.8	1	3	Dull white, smooth.
Neb. 140.47-1	R	L	289	236	17.1	T	5	Discard, deep eyes.
OB 3612-1	W	L	280	159	12.7	T	4	Small.
OB 3596-1	W	L	182	151	12.2	T	5	Deep eyes, fair skin.
1/ Not replicated. Yields only for comparison.								

Iowa Yield Tests. This trial had a total of 29 entries with 14 being classified as early and 15 late varieties. The results are given in Iowa table 2. The season was extremely favorable for potatoes and the yields were high.

In this early group 1803-1 yielded quite favorably to Cobbler, and was equal to Cobbler in quality. It was superior to Cobbler in that it had no serious-type scab. Manota was not sufficiently good to replace Cobbler, even in appearance. At Northwood, Manota heat-sprouted very severely.

In the late group B 2368-4 was nearly equal to Red Pontiac in yield, and surpassed it in total solids and was scab resistant. This selection is a Pontiac seedling and has Pontiac appearance. It may prove superior to its parent. Saco was very rough but high yielding. Cherokee remains the best yielding scab resistant smooth white. Kennebec does not have quite the quality or scab resistance. Outstanding in scab resistance and quality is I 8140-1. This is a very smooth potato. Its only fault is a poor color, but this may not prove a disadvantage. If consumers were attracted to the variety, its color might be a good marker.

Late Blight Study. Mr. Vilhelm Umaerus has just completed a study showing a relationship between late blight resistance (of the field-resistant type) and activity of the peroxidase enzyme in the leaves. The field-resistant type of late blight resistance protects the plant against all races of the pathogen, and prevents the spread of the fungus within the potato leaf. This study has made it possible to classify types of resistance to late blight as well as to select parents with high resistance. Mr. Umaerus has completed his Master's degree in Horticulture and has returned to Sweden for work on his doctorate degree.

Source of Seed Test. Through the cooperation with Mr. S. J. Oberhauser, a source of seed test was set up comparing foundation, certified, and one year removed from certified seed. The results are shown in Iowa table 3. From a statistical viewpoint, none of the differences are significant. One year's test is hardly enough from which to draw sound conclusions.

Iowa table 2. Potato yield trials, Clear Lake, 1957.

Variety	Color	Maturity	Yield U.S. No. 1 P/A.	Total yield P/A.	Total solids	Scab		Remarks
						Area	Type	
			Bu.	Bu.	Pct.			
<u>Early Varieties</u>								
Cobbler	W	M	706.6	748.3	16.7	1	5	Rough, scabby, knobby.
I 803-1	W	ME	657.3	682.4	16.0	T	3	Flat, not bright color.
Early Gem	Rus.	M	573.0	598.2	14.5	T	5	Growth cracks.
Manota	W	E	506.3	551.8	15.2	1	5	Fairly smooth.
L 1213-1	R	M	489.8	567.2	15.8	4	2	Nice red.
B 3194-Ia.1	W	E	448.2	487.9	15.0	2	3	Nice smooth white, scab resistant.
Tawa	W	E	426.9	464.6	16.5	2	3	Early, dull color.
1 1181-1	W	M	424.9	463.7	16.9	2	4	Bright skin, eyes semi-deep.
I 1155-2	W	ME	423.0	466.6	17.7	1	3	Rough, dark skin.
B 3309-8	R	E	408.5	503.4	14.3	4	2	Internal reds.
I 1084-1	R	E	379.4	426.9	16.7	3	2	Smooth red, nice color.
B 3452-10	R	ME	326.2	358.2	16.0	3	3	Discard, sl. russet.
I 1107-1	W	ME	306.8	392.0	16.5	2	2	Dull skin, discard
I 957-1	R	W	257.5	326.2	14.3	2	3	Dull colored red, discard.
L.S.D. at 5%			174.8					
L.S.D. at 1%			233.8					
<u>Late Varieties</u>								
Red Pontiac	R	L	830.5	893.5	13.9	T	5	Very rough, scabby.
Saco	W	L	825.7	864.4	16.5	T	4	Very rough.
B 2368-4	R	L	824.7	864.4	15.2	T	3	Rough.
Kennebec	W	L	723.1	766.6	16.2	T	3	Smooth, some scab.
Cherokee	W	M	697.9	740.5	16.7	3	2	Smooth and scab resistant.
B 3692-4	W	ML	632.1	745.4	16.2	T	3	Very attractive, smooth.
I 1073-1	W	L	615.6	704.7	15.2	3	2	Yellow flesh.
La 1354	R	ML	588.5	647.6	16.7	1	4	Smoother than Pontiac.
I 913-2	W	L	576.9	597.2	17.3	3	2	Round, semi-russet
I 8140-1	R	L	565.3	606.9	18.6	1	2	Nice shape.
Red La Soda	R	L	548.8	588.5	14.3	T	5	Rough scabby.
I 913-3	W	ML	483.0	547.9	14.8	1	3	Bright while like Kennebec.
B 3599-8	W	L	470.4	468.5	11.2	3	3	Watery interior, discard.
I 912-6	W	L	467.5	483.0	17.1	T	3	Round, semi-russet.
B 607-56	W	L	238.1	291.4	12.9	1	3	Discard.
L. S. D. at 5%			164.2					
L. S. D. at 1%			219.6					

Iowa table 3. Source of seed test-Clear Lake, 1957.^{1/}

Variety	Ave. of 4 Reps-Lbs.	Bu./Acre
Cherokee - Foundation	48.9	473.3
Certified	51.5	498.5
1 yr. from Cert.	42.8	414.3
Cobbler - Foundation	65.6	635.0
Certified	64.5	624.4
1 yr. from Cert.	63.1	610.8
Pontiac - Foundation	89.4	865.4
Certified	80.4	776.3
La Soda - Certified	60.4	584.7
1 yr. from Cert.	64.6	625.3
L. S. D. at 5%		187.5
L. S. D. at 1%		253.2

^{1/} Seed for this test supplied by S. J. Oberhauser.

Chipping Tests. Promising selections are chipped to determine their adaptability for this use. Results of the past 2 years are shown in Iowa tables 4 and 5. The most perfect score is 1 with poorest at 5. This is a color scale only.

Iowa table 4. Potato Chipping tests, conducted at Hiland Potato Chip Company 3/19-20/56.

Variety	Average Ratings (7 Judges)	Total Solids	Variety	Average Ratings (7 Judges)	Total Solids
Kennebec	1.0	15.6	Ia.1084.1	2.3	17.7
I 912-6	1.1	15.2	Rushmore	2.3	15.6
I 803-3	1.1	15.4	Cobbler	2.3	18.0
I 781-7	1.1	20.1	I 1120-6	2.4	16.0
Wis.0103.51	1.1	16.7	B 3131-8	2.4	16.2
I 1123-1	1.3	13.7	I 1129-4	2.4	18.4
B 2847-Ia.5	1.3	13.3	Antigo	2.4	14.1
N.D. 2910-IR	1.4	16.9	I 1015-2	2.5	22.9
Osage	1.7	17.1	Red Pontiac	2.7	14.3
I 957-1	1.7	16.5	I 961-1	2.7	16.0
I 801-10	1.7	17.7	Mich. 1363	3.0	16.5
Cherokee	1.7	16.0	I 1165-14	3.0	19.7
I 1111-10	1.8	17.3	Wash. 137-5	3.1	15.2
Minn. 119	1.8	15.4	I 913-2	3.3	14.8
I 1133-1	1.9	17.5	B 3170-Ia.1	3.5	15.6
I 1155-2	2.0	18.6	I 1034-5	3.5	16.5
I 8140-1	2.0	17.3	Triumph	4.0	14.8
La.1354	2.0	17.3	I 1073-1	4.0	15.0
Ia.1089-W138	2.0	16.2	I 1058-2	4.0	16.7
Ia.1015-4	2.1	14.3	Minn. 32.45-180-47	4.0	15.6
B3106-Ia.4	2.1	16.2	N.D.457-1-16	4.0	15.8
Wis. S1-55	2.1	15.4			

Iowa table 5. Potato chipping tests - conducted at Hiland Potato Chip Company 3/12/57.

Pedigree	Average Chipping Quality	Total Solids	Pedigree	Average Chipping Quality	Total Solids
I 781-7	1.0	19.9	N.D. 2906-IR	2.6	15.0
I 912-6	1.0	19.0	B 3124 Ia. 3	2.6	18.0
Kennebec	1.0	16.1	B 929-32	2.7	18.4
Redbake	1.0	17.1	La. 1859	2.7	17.5
B 3556-1	1.7	21.6	N.D. 457-1-10	2.7	16.5
Tawa	1.8	17.5	I 801-10	2.8	17.7
I 8140-1	1.8	20.1	I 961-1	2.9	16.0
B 3598-20	1.8	16.7	M 13	2.9	16.7
IL077-W 28-5	1.9	17.7	I 803-1	3.1	18.0
Cobbler	1.9	18.0	I 1092-2	3.1	21.8
Sebago	1.9	16.9	Cherokee	3.1	18.3
Wis. 0103.51	1.9	15.8	I 1027-18	3.2	16.7
I 1084-1	2.1	17.1	X 96-56	3.2	18.0
B 3194-Ia.1	2.1	17.1	B 3428-41	3.2	17.7
I 911-7	2.1	20.5	B 3584-5	3.3	16.9
B 3139-24	2.2	----	N.D. 457-1-16	3.8	16.0
Wis. 0112.51	2.2	19.9	Boone	3.8	14.8
B 929-23	2.4	16.2	Early Gem	3.8	15.2
Katahdin	2.4	17.3	B 3408-27	3.9	14.8
I 957-1	2.6	17.5	I 1111-10	4.0	17.7
BE 2335-42	2.6	18.3			

Insect Resistance. Preliminary tests were conducted for insect resistance in cooperation with the Department of Entomology. These tests show amazing differences in insect resistance as well as a high degree of resistance in some cases. There seemed to be no association between resistance to leaf hoppers and flea beetles. Preliminary information is given in Iowa tables 6 and 7.

Iowa Table 6. Insect resistance in potato clones, Ankeny - 1957.

Pedigree Number	Parents	Leaf Hopper Rating ^{1/}	Incidence of Hopperburn	Flea Beetle Rating
B 3821-Ia.2	X 927-3 x B24-58	1	1	3
OB 3596-1	Katahdin x OB 2905-1	2	1	2
OB 3612-1	X 792-88 x B 1299-15	2	1	3
Katahdin	40568 x 23642	1	1	3
B 3672-1	(S chacoense x Merrimack) x Cherokee	3	3	1
S 3021-1	I 872-4 x 4N chacoense	3	2	1
S 3022-1	X 927-3 x 4N chacoense	3	2	1
S 3023-1	B 2935-3 x 4N chacoense	3	3	3

^{1/} 1 = least damage
2 = moderate damage
3 = severe damage

Iowa table 7. Insect Resistance in Segregating Lines, Ankeny, 1957.

Progeny Number	Parents	Total Popu- lation	No. of Res. Selections		
			Leaf Hopper	Flea beetle	Both Insects
I 5561	I 1077-W28-25 x B 24-58	47	0	15	2
I 56321	OB 2905-1 x B962-32	190	4	0	0
I 56322	OB 2905-1 x (x96-56)	55	0	0	0
I 56324	OB 2905-1 x B 2834-3	25	0	0	0
I 56326	OB 3596-1 x B 962-32	27	2	0	0
I 56327	OB 3596-1 x Katahdin	53	0	0	0
I 56328	OB 3596-1 x Cherokee	77	3	0	0
I 56330	OB 3596-1 x B 2834-3	157	2	0	0
I 56331	OB 3596-1 x N.D. 457-1	146	0	2	0
I 56333	OB 3596-1 x I 1092-2	8	0	0	0
I 56352	Early Gem x OB 3596-1	490	0	4	0
S 5608	S 3022-1 x La. 1859	168	0	0	0
Total		11	21	2	

Scab Resistance Test. This test included both Beltsville and Iowa seedlings as shown in table 8. Most resistant were I8140-1, I913-2, B2874.4. Cherokee was also highly resistant. In all cases Cobbler was planted beside each entry as a check variety, and consistently showed 4 type scab (pitted scab).

Iowa table 8. Scab trial - Clear Lake, 1957.

Rep. 1				Rep. 2				Rep. 1				Rep. 2			
Scab Cobbler				Scab Cobbler				Scab Cobbler				Scab Cobbler			
Pedigree No.	area	check		Area	Type	check		Area	Type	check		Area	Type	check	
		area	type			area	type			area	type			area	type
I 781-7	2	1	3	4	T	3	1	4	B 3172	2	4	2	4	3	4
I 803-1	T	3	2	4	1	3	1	4	B 3309-2	2	2	2	4	T	3
I 872-4 1/2	2	1	2	4	1	2	2	4	B 3309-4 1/2	3	2	2	4	3	2
I 8140-12 1/2	2	1	2	4	2	1	2	4	B 3319-30	2	2	1	4	1	3
I 912-6	T	3	2	4	1	4	2	4	B 3453-2 1/2	4	2	3	4	3	2
I 913-22 1/2	2	1	2	4	2	1	3	4	B 3454-5	3	2	1	4	T	3
I 913-3 1/2	3	1	4	4	2	2	3	4	B 3454-14	4	3	2	4	4	3
I 961-1	2	2	2	4	T	3	1	4	B 3627-N.D.	1	3	2	4	3	2
I 1027-18	4	1	2	4	1	3	3	4	B 3832-20 1/2	2	2	3	4	-	-
I 1155-2	3	3	3	4	3	2	2	4	B 3837-11	1	3	2	4	2	4
I 1212-1	2	3	2	4	1	3	2	4	B 3849-10	1	3	2	4	2	3
Tawa	T	3	2	4	1	3	2	4	B 3857-11	3	2	2	4	1	3
Cherokee 1/2	2	1	2	4	1	2	2	4	B 3871-6	T	3	2	4	2	2
La. 1859 1/2	2	1	2	4	3	2	2	4	B 3876-25 1/2	3	2	2	4	3	2
B 2162-32 1/2	1	1	2	4	2	2	4	4	B 3897-4	2	3	2	4	1	3
B 2368-13 1/2	3	1	2	4	3	2	2	4	B 3897-9	2	3	2	4	3	2
B 2874-4 1/2	3	1	2	4	3	1	2	4	B 3897-11 1/2	2	2	2	4	3	2
B 2922-6	1	4	3	4	T	2	2	4	B 3903-1	3	1	1	4	T	3
B 3114-52	T	3	3	4	T	3	2	4	B 3964-1 1/2	3	1	2	4	3	2
B 3124-Ia. 3 1/2	2	2	1	4	T	2	2	4							

1/ Highly resistant.

2/ Most scab resistant.

Progeny Tests. This is a fundamental study to investigate new methods of breeding in potatoes, and is composed of two major phases. The first phase includes progeny testing present potato clones to determine high combining ability for yields. This is standard practice for many crops but not for potatoes. After finding such clones with high combining ability we hope to fix this character by inbreeding. The net result will be an inbred which will enable us to get good varieties without growing such large populations of seedlings as at present. We are cooperating with Dr. R. L. Plaisted of Cornell University in this study.

The other phase consists of attempting to isolate potato haploid (plants with only one-half their usual genetic make up) and use these plants for genetic studies of such characters as scab resistance, skin color, high solids, and similar characters which at present are practically unknown. The inheritance in the regular potato is extremely complex, but if haploids can be found, the inheritance becomes simplified. It may even be possible to do breeding work on the haploid level. At present we have obtained one plant which is an apparent haploid. It should be possible to obtain more, and methods are being investigated to do this. These studies have no immediate practical use, but could easily revolutionize potato breeding in the future.

KENTUCKY
Clyde Singletary

The potato yields of 5 varieties and 6 seedlings are presented in Kentucky table 1. The analysis was made only on U.S. No. 1 potatoes since any potential variety for Kentucky must compete with Irish Cobbler in No. 1 tubers.

Each variety was planted in a row 25 feet long, replicated 4 times, and its seedpieces were spaced 1 foot apart in the row and 3 feet between rows. One thousand pounds of 5-10-10 was broadcast and plowed in prior to planting. No irrigation was used although in late June and July it was very dry; resulting in a high percentage of U. S. No. 2 and cull potatoes.

Kentucky table 1. Potato variety test at Lexington, Ky., 1957.

Variety	U. S. No. 1	Total yield	U. S. No. 1
	per acre	per acre	Pct.
	Cwt.	Cwt.	
Cobbler	211.8	267.8	79.1
Red Pontiac	190.9	271.9	70.2
B-605-10	182.2	250.7	72.7
Saco	159.5	223.2	71.5
B2368-4	153.6	205.1	74.9
Kennebec	147.2	208.6	70.6
B3095-18	143.7	176.5	81.4
Katahdin	138.5	190.5	72.7
B73-3	137.9	185.4	74.4
B69-16	131.5	160.5	81.9
B137-5	129.8	169.9	76.4
L.S.D. 5%	7.3	No analysis	

Four replications - 25' each. Seed pieces spaced 1' apart in row - 3' between rows. 1,000 pounds 5-10-10 broadcast and plowed in prior to planting. Did not irrigate. Late June and July very dry. High percentage of No. 2, small and cull potatoes.

LOUISIANA
Julian C. Miller^{1/}

- - - -

The Louisiana Irish potato breeding program continued in 1957 toward its main objectives of the production of early, red and white, blight and scab resistant selections of high quality and yield. The program has concentrated, as in the past, on breeding, seedling selection, yield trials, storage tests, physiological studies and tuber processing tests. Also, considerable effort has been made in crossing Solanum acaule with Solanum tuberosum in order to obtain frost resistance. Three years out of five Louisiana growers experience considerable loss from frost, and, we, therefore, feel that an effort should be made to breeding varieties which show tolerance to frost damage. Under Louisiana conditions S. acaule has withstood temperatures as low as 25°F. without serious damage. We now have selections in the F₃.

Crosses were made in 1957 in order to obtain the above objectives, and a satisfactory set of seed was obtained. Around 10,000 seedlings from 30 parental combinations were grown in the greenhouse late in 1956. From these 1623 individual tubers were selected for planting in South Dakota in May, 1957. From this number 173 individual clones were selected for further study.

In 1957 the weather conditions for the production of potatoes in Louisiana were practically ideal. They were probably the best in the past 30 years.

The Red LaSoda variety continues to be in favor in Louisiana to the extent that 95 percent of the crop was produced from this variety, and it is interesting to note that it now ranks the 7th most important potato certified in the United States.

Selection Trials

Thirty-five 1956 seedlings were saved as seen in La. table 1. L 62-162 looked outstanding as to yield, shape and skin color in South Dakota. The field resistance of 61-193 to late blight is very encouraging.

The most promising 1955 seedlings are found in La. table 2. L 52-38, 52-39, 52-42 and 52-50 are considered the outstanding lines.

The yield results in La. table 3 consist of our advanced seedlings along with seedlings from Nebraska, Colorado and Iowa. A number of these seedlings were grown at Baton Rouge, New Roads, Donaldsonville, Diamond, Chase and Calhoun. The average yield of number ones at all locations shows that Red LaSoda was again the highest yielder. The yield of 305.6 bushels per acre of Red LaSoda from Wisconsin compared to 198.9 bushels of Triumph from Wisconsin shows that Red LaSoda is far superior to Triumph in Louisiana. L 42-45 may have some possibility due to its degree of resistance to scab. Of the seedlings with a white skin, 91-78 outyielded varieties, Sebago,

^{1/} In cooperation with T. P. Dykstra, of the United States Department of Agriculture and the National-Breeding Program.

Katahdin, and Cherokee. This seedling is also rated as a better chipper than Sebago. The performance of 91-143 was below normal due to the fact that through error the seedpieces were cut too small.

In La. table 4 are shown the yields of LaSoda and Red LaSoda compared to yields of other standard varieties over a six-year period (1952 through 1957) at Baton Rouge. As will be seen from this table the two LaSodas continued to outyield other standard varieties.

La. table 1. Data on 1956 Seedlings Selected in South Dakota - Fall, 1957

Variety or Seedling	Parentage	Late Blight Reading*	Remarks
62- 7	LaSoda x 12-92	?	Left in S.D.
62- 16	LaSoda x 12-92	+	
62- 18	LaSoda x 12-92	+	
62- 22	LaSoda x 12-92	+	
62- 23	LaSoda x 12-92	+	
62- 24	LaSoda x 12-92	+	Left in S.D.
62- 32	LaSoda x 1859	+	
62- 41	LaSoda x 92-23	+	
62- 42	LaSoda x 92-23	?	
61- 45	LaSoda x 92-23	?	
62-53	LaSoda x 92-23	+	
61- 55	LaSoda x 92-23	+	
62- 61	LaSoda x 12-92	+	Left in S.D.
61- 67	Red LaSoda x 92-23	+	
62- 71	LaSoda x 1859	+	
62- 74	LaSoda x 1859	+	
61- 81	Cherokee x DeSoto	+	
62- 84	Triumph x 12-69	+	
62- 89	Triumph x 92-23	+	
62- 91	Triumph x 92-23	+	
61-103	Triumph x 1859	+	
62-105	Triumph x 1859	+	
61-119	Sheridan x 92-23	+	
61-125	92-167 x 12-25	+	
62-127	92-167 x 92-23	+	Left in S.D.
62-128	92-167 x 92-23	+	Left in S.D.
62-134	92-167 x 92-23	+	
62-138	92-167 x LaSoda	+	Saved for S.D.
62-143	92-167 x LaSoda	+	Left in S.D.
62-162	92-167 x 12-92	+	Looked outstanding in S.D.
62-174	12-69 x 12-92	+	Left in S.D.
62-185	12-51 x 1859	+	
61-193	1859xNebr. 26.44-1	-	
61-195	1859xNebr. 26.44-1	+	
61-206	01-104 x 92-167	+	Left in S.D.

* This field reading was taken at Plaquemines Parish Experiment Station.

+ = blight - = no blight

La. table 2. Data on 1955 Seedlings

Seedling or Variety	Vigor Rating*	Parentage	Yield Bu/A #1's	Late Blight Reading**	Remarks
52-1	3.0	12-92 (x)	149.8	+	
52-7	4.5	12-92 (x)	-----	+	Discard in La. Keep in S.D.
51-13	4.0	12-46 (x)	-----	+	Discard in La. Keep in S.D.
52-21	3.0	02-05x1894	145.2	+	
52-23	3.0	12-27 (x)	-----	+	Discard in La. Keep in S.D.
52-38	1.5	22-194 (x)	288.7	+	Very promising Some seed
52-39	2.5	22-194 (x)	256.1	?	Some seed - looks O.K.
52-42	2.0	22-194 (x)	306.9	+	Sets seed readily - promising
52-50	3.0	22-194 (x)	290.6	+	Sets seed
Red LaSoda	2.0		370.5	+	

* Plant vigor rating taken 68 days after planting

- 1 = very vigorous
- 2 = vigorous
- 3 = intermediate
- 4 = weak
- 5 = very weak

** This field reading was taken at Plaquemines Parish Experiment Station.

+ = blight - = no blight

La. table 3. Irish Potato Variety and Seedling Tests for 1957.

Variety or Seedling	Late Blight Reading*	Vigor Rating**	Yield of No. 1's per Acre						
			Baton Rouge Bu.	New Roads Bu.	Donald- ville Bu.	Diamond Bu.	Chase Bu.	Calhoun Bu.	Average Bu.
LaSoda S.D.	+	2.0	356.8	253.5	159.0	235.1	241.7	263.7	251.6
Red LaSoda S.D.	+	2.0	370.5	260.1	138.3	128.5	164.5	259.9	220.3
Triumph Wisc.	+	3.0	268.3	263.4	109.8	213.2	117.1	221.6	198.9
Red LaSoda Nebr.	+	2.0	473.1	325.5	181.8	335.8	278.1	300.8	315.9
Red LaSoda Wisc.	+	2.0	400.9	413.4	139.5	381.1	221.8	276.8	305.6
Sebago Wisc.		3.5	253.3	225.6	114.3	263.5	109.9	135.7	183.7
Katahdin Wisc.		3.0	297.4	205.8	81.0	269.4	94.6	145.8	182.3
LaSalle S.D.		2.5	177.1	124.8	101.1	221.2			156.1
Cherokee	-	3.0	371.4	241.5	94.2	211.0			229.5
Rushmore Wisc.		3.5	156.2	109.2				115.7	127.0
Triumph		4.0	99.0						
LaSoda Nebr.		2.0	430.8						
Red Baker		2.5	300.5						
Tawa		4.0	145.7						
91-78	?	3.0	342.8	288.6	146.7	256.2	141.3		235.1
91-143	-	2.0	200.7	187.2		187.6			191.8
41-21	+	3.0	322.3	265.2	87.6	233.6		225.6	226.9
42-45	+	1.5	418.1	277.8	131.1	272.3	151.5	256.0	251.1
1859		2.5	425.2	318.0	163.2	361.4	201.8		293.9
Ia. 801-10		4.0	239.7						
Colo. 12240 (nlce red)		4.0	149.4						
Colo. 11012		4.0	114.4						
Nebr. 315-48-3X		3.0	335.1						
Nebr. 223.48-1X		3.5	171.2						
82-49-X		3.5	242.4						

*This field reading was taken at Plaquemines Parish Experiment Station: + = blight; - = no blight.

**Plant vigor rating taken 68 days after planting: 1 = very vigorous; 2 = vigorous; 3 = intermediate;

4 = weak; 5 = very weak.

La. table 4. Yields of LaSoda and Red LaSoda Compared to Yields of other standard varieties over a six-year period at Baton Rouge.

Variety or Selection	Yield of No. 1's per Acre						Average
	Year						
	1952	1953	1954	1955	1956	1957	
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
LaSoda	352.4	297.8	188.4	201.5	220.9	393.8	275.8
Red LaSoda	--	311.9	203.3	110.3	281.7	414.8	264.4
Triumph	241.4	251.5	165.7	81.2	100.7	183.7	170.7
Katahdin	--	--	216.1	121.6	203.8	297.4	209.7
Sebago	--	--	177.0	29.5	201.9	253.3	165.4
Rushmore	--	166.2	160.5	78.7	79.1	105.1	117.9

Blank spaces indicate that a seedling or variety was not in yield tests during that year.

Quality Studies

La. table 5 shows the chip quality of several standard varieties and advanced seedlings. Of these, Katahdin, Sebago and 91-78 were outstanding. Seedling 91-78 appears to be most satisfactory because it can be processed into quality chips, and it yields better than Katahdin or Sebago under Louisiana conditions.

La. table 5. Chip Quality of Several Potato Varieties and Seedlings.

Variety or Seedling	Recover-	Reduc-	Total	Color*	Flavor*	Texture*
	able Chips	ing Sugar	Solids			
	Pct.	Pct.	Pct.			
Red LaSoda	32.0	.042	16.0	3.0	4.8	5.2
LaSoda	32.0	.042	16.9	3.0	3.4	3.8
Katahdin	35.0	.050	17.2	8.6	6.0	6.8
Cherokee	28.0	.025	17.2	4.0	8.0	6.0
Rushmore	32.0	.030	17.4	6.7	6.0	6.4
LaSalle	34.0	.050	17.5	6.0	6.0	5.4
Triumph	31.0	.050	16.9	2.4	4.4	4.2
Sebago	32.0	--	16.9	8.2	6.8	7.0
91-143	32.0	.045	17.5	3.0	3.6	4.4
41-21	32.0	--	17.7	3.7	4.6	5.4
91-78	37.0	.050	18.2	6.0	5.4	5.0
42-45	33.0	--	16.0	2.6	4.6	4.8
1859	33.0	.042	18.0	2.4	4.6	4.0
91-10	30.0	.057	15.6	2.0	5.0	4.0

* 0, repulsive; 1, very poor; 2, poor; 3, poorly fair; 4, fair; 5, acceptable; 6, fairly good; 7, good; 8, very good; 9, excellent; and 10, ideal.

Test on Resistance to Common Scab

A test on the resistance to common scab (Streptomyces scabies) of all the seedlings in the Irish potato development project was carried out in the spring of 1956 at the Plaquemines Parish Experiment Station at Diamond, Louisiana. The results of this test are shown in La. table 6. The following selections, as brought out in this table, showed some resistance to scab: 92-23, 91-78, 91-143, 92-167, 12-92, 12-94, 22-153, 22-194, 21-367, 42-23, 42-45, along with the Cherokee variety. This test was duplicated in 1957, but conditions were not ideal for scab infection.

Resistance to Late Blight

Field readings are listed in La. tables 1, 2, and 3. The Cherokee variety and seedlings 91-143 and 61-193 showed resistance to late blight. Seedlings 91-78, 62-7, 62-42, 61-45 and 52-39 did not show as high a degree of resistance as 91-143.

La. table 6. Resistance of Seedlings and Check Varieties to Scab in 1956. Plaquemines Parish Experiment Station, Diamond, Louisiana.

Variety or Seedling	Depth of lesions*	Surface covered with scab**	Remarks
		Pct.	
LaSoda	3	10	None
Red LaSoda	3	10	None
Triumph	3	10	None
Rushmore	3	10	None
LaSalle	4	30	None
Cherokee	trace	trace	Very good
1859	2	trace	None
92-23	trace	trace	Very good
91-78	2	trace	None
91-143	trace	trace	None
92-167	2	10	None
12-91	2	trace	None
12-92	1	trace	Good shape and color
12-94	1	trace	None
22-153	1	trace	Good
22-194	1	trace	None
42-23	1	trace	Good
42-45	2	trace	Very good

* Rating from 1 to 5. 1 = very shallow lesions and 5 = very deep lesions.

**% of surface covered with scab: trace, 10%, 30%, 50%, 70%, 90%.

Date of planting - January 19, 1956; date of harvesting - April 20, 1956.

Rest Period Length

The length of the rest period of certain Irish potato varieties and seedlings stored at 60°F. is shown in table 7. Representative samples of each of these varieties and seedlings were taken from variety yield test plots at harvest time and placed in storage at 60°F. The tubers were observed periodically during storage in order to determine the date on which a particular variety or seedling began to sprout. When a sample was observed to have as many as ten tubers with one or more sprouts each of one-quarter to an inch in length, the variety or seedling was considered as having completed its rest period. The results of this determination are shown in table 7.

There was a considerable difference in the length of the rest period among the varieties. Only Triumph and Rushmore exceeded 100 days, and Katahdin was the shortest at 90 days. Several of the seedlings exceeded 100 days. Seedling 1859 had the longest rest period of all the seedlings and varieties tested (122 days) and seedling 91-143 the shortest (84 days).

La. table 7. The Length^{1/} of the Rest Period^{2/} of Certain Irish Potato Varieties and Seedlings Stored at 60°F.

Variety or Seedling	Length of Rest Period ^{3/} (Days)	Variety or Seedling	Length of Rest Period ^{3/} (Days)
Red LaSoda	93 (4)	82-94	99 (3)
LaSoda	89 (4)	92-10	88 (3)
Triumph	102 (4)	91-78	87 (4)
Katahdin	90 (4)	91-143	84 (4)
Sebago	93 (1)	1859	122 (2)
LaSalle	92 (2)	2988	103 (1)
Rushmore	109 (3)	5347	96 (1)
21-367	110 (2)	6078	99 (1)
22-194	90 (1)	6088	99 (1)
32-92	90 (1)	6230	93 (1)
41-21	96 (1)	6279	118 (1)
42-45	103 (1)	6542	112 (1)

^{1/} Length of time required after harvest for sprouts to attain a length of approximately 0.25 inch.

^{2/} Placed in 60°F. storage immediately after harvest.

^{3/} The figure in parenthesis represents the number of years which a particular variety or seedling has been tested.

MAINE

Reiner Bonde, R. V. Akeley and D. Merriam

Comparison of Yields and Ring-Rot Infection in Certain
Resistant Seedlings and Commercial Varieties

An experiment was conducted to determine the extent that certain resistant seedlings and susceptible commercial varieties would become infected with bacterial ring rot when the seed stocks were badly contaminated and grown under field conditions.

Cut seed potatoes of 16 selected seedlings and 8 commonly grown varieties were contaminated with ring-rot bacteria by being dipped in a water suspension of viable bacteria. The inoculated seedpieces were permitted to air dry and then planted by machine in replicated plots in the field. The potatoes were planted May 18 and harvested on September 17. They were cultivated, sprayed and harvested by methods generally used by Maine farmers.

Observations were made regarding the percentage of infected plants and tubers that were present in the different field plots, as well as the yields produced. This information is summarized in Bonde table 1.

Bonde table 1. Comparison of ring-rot infection and yields for resistant seedlings and commercial varieties.

Pedigree No.	Infected Plants Pct.	Tuber Decay Pct.	Yield per acre ^{1/} Bu.	Pedigree No.	Infected Plants Pct.	Tuber Decay Pct.	Yield Per Acre ^{1/} Bu.
B2855-5	0	0	641	B3478-58	8	0	477
B911-39	0	0	610	B911-21	0	0	464
B2895-31	12	0	602	B3354-18	0	0	457
B3354-20	2	0	591	B725-32	24	0	420
B3352-15	0	0	589	Teton	3	32/	460
B3141-3	0	0	558	Kennebec	100	59	541
B2900-37	24	3	557	Green Mt.	100	69	506
B3478-45	0	0	538	Burbank	100	47	479
B909-2	0	0	537	Cherokee	100	18	467
B3477-39	0	0	531	Katahdin	100	29	445
B3478-22	0	0	518	Chippewa	100	43	445
B725-32	4	0	487	Cobbler	100	20	263

1/ Average of 5 replicated one-row plots each containing 50 seedpieces

2/ About 18 percent of tubers were slightly infected after being in heated storage for several weeks.

It can be observed that all of the selected seedlings, with the exception of Teton, were more resistant to infection than the commercial varieties. Ten of the 15 seedlings tested had no ring-rot symptoms in either the plants or the tubers. Only one of the seedlings had a few tubers that had symptoms of being infected at time of harvest.

Teton, a resistant variety, had 3 percent infected tubers when dug, but developed 18 percent slightly infected tubers after being held in warm storage. The extent of tuber rot in the other named varieties varied from 18 percent in Cherokee to 69 percent in Green Mountain. However, after being in storage, the extent of decay was greatly increased in the named varieties and very few tubers were marketable. Although some tubers in the resistant varieties may be infected when examined at a later date, the extent of decay in most cases will be slight and limited to the vascular ring of the potato tuber.

MAINE

Hugh J. Murphy, Allen E. Schark and Michael Goven

Variety yield trials were conducted in 1957 at Presque Isle, Exeter, Rumford Point, and Lille. The parentage and main characteristics of the varieties and seedlings tested, are given in Murphy table 1.

Murphy table 1. Parentage and characters of varieties and seedlings in yield trials, Maine, 1957.

Variety	Parentage	Matur- ity	Skin color	Disease resistance ^{1/} and notes
50B9-8	Teton x B446-58	M	W	Lb,sc,virus X & Y.
Saco	41956 x 96-56	M	W	Lb,virus A & X,N.nec.
Plymouth	Mohawk x 96-56	E	W	Lb,sc,net nec.
Boone	TI-5 x B 231-3	L	W	Lb,net nec.
Knik	Artic Sdlg. x Minn. 56-1	M	W	Sc.
47156	45208 x Earlane	L	W	Virus A, yellow flesh.
Katahdin	40568 x 24642	L	W	Virus A,lr, net nec.
Kennebec	B 127 x 96-56	M	W	Lb, virus A, net nec.
B 3397-17	B 2113-9 x B 864-2	L	W	Lr., vert wilt.
Cherokee	96-56 x 528-170	E	W	Lb.,sc, virus A.
R. Burbank	- - - - -	L	Russ	Sc.
La 1859	Pontiac x 96-56	M	R	Lb.,sc.
Irish Cobbler	- - - - -	E	W	Virus A.
Delus	Mohawk x 96-56	M	W	Lb.,sc.
B 137-5	Sequoia x 47562	E	W	- - -
Russet Rural	- - - - -	L	Russ	Sc.
B 1399-12	B2444-16 selfed	L	W	Lr.
B 3299-13	B 936-12 x Katahdin	L	W	Lr.
Tawa	B 595-76 x B 76-23	E	W	Lb.,sc, virus X
B 3095-18	Houma x Triumph	E	W	Lr.
49 B 13-2	- - - - -	M	W	Vert. W.
B 3400-1	B 24-58 x B922-3	E	Yell	Lr.
B 2938-22	B 355-44 x B 522-33	M	W	Lr.
B 2187-25	1276-185 x B 522-33	M	W	Vert. W., sc,Lr.
B 2971-14	B 574-14 x B 872-70	E	W	Lr.
B 920-7	B 401-3 x B 355-24	E	W	Lb., sc.
B 579-3	B 24-58 x Katahdin	M	W	Lr.
B 75-4	47562 x 96-28	E	W	Lb.

1/ Virus X is the Latent mosaic virus and in combination with virus A results in Mild mosaic and in combination with virus Y results in Rugose mosaic.

Late blight resistance is to the common race of the organism.

Net necrosis is a tuber necrosis caused by current-season infection with leaf roll virus.

The results for yield and total solids are presented in Murphy table 2.

Murphy table 2. Yield and total-solids content of potato varieties grown at four locations in Maine, 1957.

Variety	Presque Isle		Exeter		Rumford Point		Lille	
	Yield cwt/A.	Total Solids	Yield cwt/A.	Total Solids	Yield cwt/A.	Total Solids	Yield cwt/A.	Total Solids
50B9-8	412	19.8	335	19.2	278	19.2	238	20.0
Saco ^{1/}	399	21.9	395	22.1	361	22.7	226	23.0
Plymouth	389	19.8	308	20.4	235	19.8	202	22.1
Boone	376	16.8	412	19.6	346	21.1	267	20.0
Knik	373	20.0	364	20.6	347	20.4	235	20.0
Katahdin	365	20.6	331	20.4	222	21.1	215	21.1
Kennebec	361	21.1	361	21.7	320	21.5	211	21.7
B 3397-17	336	21.7	299	21.3	264	23.0	143	21.1
R. Burbank ^{1/}	328	20.0	331	20.4	254	22.5	182	20.8
B 3299-13	314	20.4	328	20.4	228	20.8	202	21.1
B 2187-25	271	19.6	315	20.8	224	20.2	178	21.3
B 2971-14	266	21.7	250	21.3	160	20.4	157	22.7
B 920-7	263	20.6	184	21.5	107	19.2	190	20.2
B 75-4	196	21.5	91	23.4			93	21.7
Delus	323	22.7	333	23.8			211	24.2
La 1859	327	20.0	373	21.1			244	20.0
47156	372	21.1						
Cherokee	333	21.1						
Irish Cobbler	325	22.5						
B 137-5	325	19.4						
Russet Rural	320	19.8						
B 1339-12	319	21.5						
Tawa	312	21.1						
B 3095-18	307	19.8						
49B13-2	298	19.8						
B 3400-1	290	18.7						
B 2938-22	289	18.5						
B 579-3	245	22.1						
L. S. D. at 5%	31	0.6	46	0.6	50	0.6	36	0.6
L. S. D. at 1%	40	0.8	61	0.8	67	0.8	48	0.8

^{1/} Seedpieces of Saco spaced 10 inches apart; Russet Burbank spaced at 16 inches; all other varieties at 8 inches.

Planted	May	13	May	12	May	28	May	23
Killed	Sept.	9	Sept.	10	Sept.	15	Sept.	12
Harvested	Sept.	17	Sept.	28	Oct.	15	Sept.	20
Fertilizer lbs/A.	120-180-180		120-180-180		120-180-180		160-240-240	

Yield distribution for U.S. No. 1 and U.S. No. 1 (Size A) are given in Murphy table 3.

Murphy table 3. Percentage of yield between 1-7/8 and 1/4 inches in size for potato varieties grown at four locations in Maine, 1957.

Variety	Presque Isle		Exeter		Rumford Point		Lille
	Class ^{1/} 1-7/8-1/4	Class 2 1/4-1/4	Class 1-7/8-1/4	Class 2 1/4-1/4	Class 1-7/8-1/4	Class 2 1/4-1/4	Class 1-7/8-1/4
	inches	inches	inches	inches	inches	inches	inches
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
50B9-8	97	83	88	77	87	82	88
Saco	96	83	94	80	96	91	90
Plymouth	96	84	96	87	95	71	91
Boone	96	84	95	88	89	86	89
Knik	96	90	95	87	96	92	87
Katahdin	95	80	93	76	96	84	82
Kennebec	94	86	96	87	96	90	93
B 3397-17	89	59	82	50	90	66	67
Russet Burbank	63 ^{1/}	--	60	--	60	--	55
B 3299-13	94	72	93	74	91	89	82
B 2187-25	93	77	92	71	95	84	83
B 2971-14	85	48	83	49	79	47	77
B 920-7	94	69	92	72	93	76	89
B 75-4	97	76	93	79			96
Delus	97	90	96	91			93
La 1859	95	81	96	86			90
47156	96	83					
Cherokee	93	81					
Irish Cobbler	91	68					
B 137-5	91	62					
Russet Rural	96	85					
B 1339-12	95	82					
Tawa	96	80					
B 3095-18	95	87					
49B13-2	95	84					
B 3400-1	95	74					
B 2938-22	91	70					
B 579-3	92	57					

^{1/} Russet Burbank sized from 1/4 to 10 ounces by weight.

Chip color and French fry color and texture indices are presented by Murphy tables 4 and 5 respectively.

Murphy table 4. Chip color indices for potato varieties grown at four locations in Maine, 1957.^{1/}

Variety	Presque Isle	Exeter	Rumford Point	Lille
50B9-8	8.9	6.8	9.1	6.9
Saco	6.2	5.0	7.1	4.2
Plymouth	6.2	4.6	7.4	4.1
Boone	10.0	8.1	10.0	9.4
Knik	9.8	7.1	9.4	7.4
Katahdin	5.7	4.1	6.5	4.2
Kennebec	5.6	3.7	5.9	3.3
B 3397-17	6.7	5.2	7.3	4.8
Russet Burbank	7.7	6.0	6.3	4.9
B 3299-13	4.1	4.1	6.2	3.3
B 2187-25	7.6	4.8	7.3	4.8
B 2971-14	4.7	5.0	5.7	4.1
B 920-7	5.7	4.8	7.9	4.6
B 75-4	5.6	4.7		4.8
Delus	4.8	4.2		3.8
La 1859	8.0	6.6		6.2
47156	8.0			
Cherokee	4.2			
Irish Cobbler	5.8			
B 137-5	6.9			
Russet Rural	7.7			
B 1399-12	7.9			
Tawa	4.2			
B 3095-18	7.5			
49B13-2	4.9			
B 3400-1	8.5			
B 2938-22	8.2			
B 579-3	6.0			
L. S. D. at 5%	1.0	0.9	0.9	0.9
L. S. D. at 1%	1.4	1.3	1.2	1.2

^{1/} 1 = very light
10 = very dark

Color indices based on standard National Potato Chip color reference chart.

Murphy table 5. French fry color and texture indices for potato varieties grown at four locations in Maine, 1957.¹

Variety	<u>Presque Isle</u>		<u>Exeter</u>		<u>Rumford Pt.</u>		<u>Lille</u>	
	Index		Index		Index		Index	
	Color	Texture	Color	Texture	Color	Texture	Color	Texture
50B9-8	7.3	3.0	6.1	3.0	8.3	3.0	4.7	3.0
Saco	5.0	3.0	4.5	3.0	6.3	3.0	3.6	3.0
Plymouth	5.5	2.6	4.7	2.6	6.9	2.5	4.2	2.7
Boone	10.0	3.0	7.9	3.0	9.7	3.0	8.4	3.0
Knik	9.4	3.0	6.7	3.0	8.3	3.0	6.1	3.0
Katahdin	5.3	3.0	4.4	3.0	5.7	3.0	3.7	3.0
Kennebec	4.5	3.0	3.5	3.0	5.4	3.0	3.0	3.0
B 3397-17	5.4	3.0	4.6	3.0	6.7	3.0	3.9	3.0
Russet Burbank	5.9	3.0	5.5	3.0	5.6	3.0	4.3	3.0
B 3299-13	3.8	3.0	4.0	3.0	5.7	3.0	3.5	3.0
B 2187-25	5.9	3.0	4.3	3.0	6.2	3.0	4.0	3.0
B 2971-14	4.6	3.0	4.7	3.0	5.3	3.0	4.0	3.0
B 920-7	4.9	2.8	4.8	3.0	7.5	2.7	4.3	3.0
B 75-4	4.9	3.0	4.3	3.0			4.3	3.0
Delus	4.9	3.0	4.3	3.0			3.5	3.0
La 1859	6.9	3.0	5.8	3.0			6.3	3.0
47156	6.6	3.0						
Cherokee	3.9	3.0						
Irish Cobbler	5.1	3.0						
B 137-5	5.3	3.0						
Russet Rural	6.3	3.0						
B 1399-12	7.0	3.0						
Tawa	4.2	3.0						
B 3095-18	6.4	3.0						
49B13-2	4.5	3.0						
B 3400-1	6.3	3.0						
B 2938-22	6.2	3.0						
B 579-3	5.3	3.0						
L. S. D. at 5%	0.9	0.1	1.6	0.1	0.8	0.2	1.0	0.1
L. S. D. at 1%	1.2	0.2	2.0	0.2	1.1	0.3	1.3	0.2

French fry color:

1 = very light
10 = very dark

French fry texture:

1 = soggy
3 = mealy

MAINE

G. W. Simpson, Reiner Bonde, R. V. Akeley and Donald Merriam

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Leafroll-Resistant Seedlings

Green peach aphids, held on leafroll Katahdin plants for a week, were transferred to field-growing seedlings. The aphids were allowed to develop on the seedlings for about one month when the infestation was reduced by means of parathion. In 1957, 5,224 tubers from the greenhouse at Beltsville, Maryland, were planted on Aroostook Farm and tested for leafroll resistance for the first time. Twenty-one crosses and one selfed line were represented. In addition to the new seedlings and those saved from previous introductions for retesting, 470 seedlings from Iowa and Idaho representing 8 crosses; and 160 selections from Chapman, representing 25 crosses and 3 selfed lines, were included in the 1957 test.

The seedlings were read for current-season-leafroll symptoms in August and any showing leafroll was eliminated; the others were saved for further testing. On this basis 436 hills (7.4 percent of the 5,854 seedlings growing) were saved for retesting.

Healthy tubers of Green Mountain, Katahdin, Chippewa, and Kennebec were planted systematically among the seedlings and were infested at the same time as the seedlings were infested with green peach aphids. All of the growing plants from these tubers showed symptoms of current-season leafroll in August.

Results since the 1954 introductions are shown in Maine tables 1 to 6.

Maine table 1. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive years, 1954 - 1956.

Pedigree	Parentage	Seedlings planted in 1954 ^{1/}	Replanted			Healthy in 1957
			1955	1956	1957 ^{2/}	
B 3558	B 859-10 x Katahdin	378	35	4	1	0
B 3559	B 859-10 x B 24-58	337	148	40	9	5
B 3562	B 2946-5 x B 24-58	246	59	21	1	0
B 3563	X 927-3 x Katahdin	174	3	1	1	0
B 3578	Imperia x B 24-58	206	39	12	1	0

^{1/} 25 crosses and 3 selfed lines were represented in 1954.

^{2/} Not inoculated in 1957.

Maine table 2. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive years, 1955 - 1957.

Pedigree	Parentage	Seedlings planted in 1955 ^{1/}	Replanted		Surviving 3 years
			1956	1957	
B 3802	B 859-10 x B 24-58	236	16	5	3
B 3806	B 2944-65 x B 24-58	241	4	1	1
B 3808	B 2946-5 x B 24-58	254	12	4	3
B 3810	B 2962-6 x B 24-58	188	3	3	3
B 3815	B 24-58 x B 2834-3	250	15	8	3
B 3821	X 927-3 x B 24-58	351	9	1	1
B 3824	X 927-3 x B 2946-5	306	7	1	1
B 3825	X 927-3 x B 2963-7	351	10	4	1
B 3826	1286-185 x B 24-58	218	31	11	5
B 3827	B 2925-23 x B 24-58	227	37	12	7
B 3850	B 2925-23 x B 2361-2	28	2	2	1

^{1/} 25 crosses and 3 selfed lines were represented in 1955.

Maine table 3. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 2 successive seasons, 1956 - 1957.

Pedigree	Parentage	Seedlings planted ^{1/} in 1956	Replanted 1957	Saved for retesting in 1958	Surviving two inoculations
		No.	No.	No.	Pct.
B 4088	Houma x B 2834-3	315	5	1	0.3
B 4095	Rural New Yorker x B 2834-3	360	9	3	0.8
B 4107	X 927-3 x Earline	334	7	3	0.9
B 4111	B 1172-14 x B 24-58	411	2	2	0.5
B 4121	B 2925-23 x B 294-38	80	8	2	2.5
B 4122	B 2925-23 x Aquila	118	2	2	1.7
B 4123	B 2925-23 x B 2359-84	168	24	16	9.5
B 4126	B 2958-2 x B 3186-6	272	2	1	0.4
B 4127	B 2962-6 x B 2359-84	264	16	10	3.8
B 4139	B 3299-13 x B 2359-84	290	4	1	0.3
B 4142	41956 x B 2962-6	244	7	2	0.8
B 4163	X 927-3 x B 606-3	69	3	1	1.4

^{1/} 22 crosses and 1 selfed line represented in 1956.

Maine table 4. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculations with viruliferous green peach aphids in 1957.

Pedigree	Parentage	Seedlings planted in 1957	Saved for retesting in 1958	Surviving the first year's inoculation
		No.	No.	Pct.
B 4236	Houma x B 24-58	267	63	23.6
B 4239	" x B 3556-12	426	91	21.4
B 4240	Katahdin x "	86	2	2.3
B 4256	Sebago x "	426	21	4.9
B 4260	B 24-58 x B 3139-24	384	8	2.1
B 4261	" x B 3556-12	226	15	6.6
B 4263	B 24-78 x B 3299-13	98	4	4.1
B 4264	" x B 3556-12	486	86	17.7
B 4266	" x Ac. 26031	30	2	6.7
B 4268	B 294-38 x B 3299-13	140	0	0.0
B 4277	B 606-3 x "	37	0	0.0
B 4282	B 606-37 x B 3556-12	64	2	3.1
B 4292	B 926-9 x "	452	24	5.3
B 4213	X 927-3 x B 4005-10	383	26	6.8
B 4301	B 2067-52 x B 3556-12	151	2	1.3
B 4310	B 3299-13 x B 24-58	382	19	5.0
B 4311	B 3302-68 x B 3556-12	475	23	4.8
B 4333	B 2962-6 x B 1172-16	158	0	0.0
B 3535	Houma x B 294-38	165	5	3.0
B 4341	B 1383-5 x B 922-3	152	11	7.2
B 4343	B 2962-6 x ND 457-1	185	5	2.7
B 1522	B 3556-12 selfed	51	3	5.9
		5,224	412	7.9

Maine table 5. Reaction of 25 crosses and 3 selfed lines from Chapman Farm, to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in 1957.

Pedigree	Parentage	Selections ^{1/2/} tested No.	No. of hills infested					
			0	1	2	3	4	5
B 4087	Early Gem x B 2834-3	6				1		5
B 4088	Houma x B 2834-3	2		1				1
B 4095	Rural New Yorker x B 2834-3	3						3
B 4098	B 595-76 x B 2834-3	4				1		3
B 4100	792-88 x B 2359-84	17	3		2			12
B 4101	792-88 x B 2962-6	9					2	7
B 4102	792-94 x Katahdin	17					1	16
B 4113	B 1395-57 x B 2834-3	5						5
B 4116	B 2359-84 x B 2834-3	8	4	2			1	1

continued

Maine table 5, continued.

Pedigree	Parentage	Selections ^{1/2/} tested No.	No. of hills infested					
			0	1	2	3	4	5
B 4120	B 2834-3 x B 2162-36	2					1	1
B 4128	B 2962-6 x B 2969-15	17			1	1		15
B 4137	B 3209-35 x B 2962-6	2						2
B 4141	B 3310-5 x B 2834-3	3				1		2
B 4144	47156 x B 2834-3	5						
B 4145	Houma x B 3195-3	4	1			2		1
B 4146	Katahdin x 1376-2	6					1	5
B 4147	" x 1376-6	2						2
B 4148	" x B 3195-3	2						2
B 4149	Marygold x B 24-58	3	2					1
B 4152	B 24-58 x 1376-2	11		1		1	1	8
B 4153	B 24-58 x 1376-6	9				1		8
B 4154	B 24-58 x B 3195-3	6	3					3
B 4155	B 24-78 x B 3195-3	6			1			5
B 4168	B 3097-82 x B 2962-6	6	1			2		3
B 4178	47156 x Aquila	1						1
B 1493	B 24-58 selfed	1						1
B 1494	927-3 selfed	1						1
B 1497	B 2834-3 selfed	1				1		

1/ Each seedling had 5 plants tested.

2/ Eight 5-hill Green Mountain checks all showed symptoms of current season leafroll infection.

Maine table 6. Reaction of certain progenies from the Idaho and Iowa breeding programs to leafroll infection following inoculation with viruliferous green peach aphids in 1956 and 1957.

Pedigree ^{1/}	Parentage	Number tested 1956	Replanted 1957	Saved for retesting in 1958
A 434	B 2759-5 x B 986-7	?	6	2
A 437	B 2759-5 x Aquila	?	2	1
I 1419	X 927-3 x I 1077-W 28-5	870	11	8
I 1443	X 927-3 x I 1106-1	417	4	1
I 1445	X 927-3 x B 3131-8	150	5	1

1/ 'A' stands for Idaho lines and 'I' for Iowa lines.

MASSACHUSETTS
Karol J. Kucinski

Massachusetts table 1. Shows yields and quality data of eighteen varieties of potatoes tested in 1957 for comparative yields at the Massachusetts Agricultural Experiment Station, Amherst, Massachusetts. Each variety was planted in fifty-foot rows, replicated four times. A ton per acre of 10-10-10-2 fertilizer was applied in drill. The plots were sprayed weekly with 50% wettable dithane, two pounds per 100 gallons, supplemented with D.D.T. as needed. Tractor and sprayer rows were eliminated by using a side-arm boom for spraying.

Average Yield per Acre (Cwt.)						Average Yield per Acre (Cwt.)					
Variety	Size A	Size B	Total	Av. Dry Matter	Quality Rank	Variety	Size A	Size B	Total	Av. Dry Matter	Quality Rank
	Cwt.	Cwt.	Cwt.	Pct.			Cwt.	Cwt.	Cwt.	Pct.	
B2368-4	395	18	413	18.98	7	Kennebec	227	10	237	18.52	11
Saco	385	10	395	20.35	2	Delus	208	11	219	19.92	4
Green Mt.	355	16	371	20.92	1	Sebago	204	10	214	17.75	15
Houma	284	20	304	19.70	5	Cherokee	191	12	203	18.92	8
Pungo	280	15	295	18.91	9	B3397-17	176	17	193	17.54	17
Teton	269	11	280	17.55	16	Cobbler	159	12	171	18.30	13
B926-9	261	13	274	16.44	18	Plymouth	162	7	169	18.18	14
Katahdin	231	12	243	18.31	12	Merrimack	153	14	167	20.01	3
R.Burbank	215	24	239	19.06	6	B595-76	116	15	131	18.62	10

Massachusetts table 2 shows data of tests made on three different soil types in the Connecticut River Valley under farmer conditions of cultivation and spraying. One hundred feet of each row was harvested. Tractor rows were not used. The soil types were silt loam, fine loamy sand, and fine sandy loam respectively for Farms A, B, and C.

Massachusetts table 2. Potato tests on 3 different soils on 3 different farm areas in Connecticut River Valley, 1957.

Variety	Farm A		Farm B		Farm C	
	Silt Loam		Fine Loamy Sand		Fine Sandy Loam	
	Total Yield Per Acre	Total Solids	Total Yield Per Acre	Dry Matter	Total Yield Per Acre	Total Solids
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
Green Mt.	234	18.7	273	19.7	374	19.4
Katahdin	280	18.9	252	18.9	229	18.7
Cobbler	265	18.4	308	19.4	138	20.1
Russet Burbank	204 ^{1/}	19.4	235 ^{1/}	19.9	195 ^{2/}	17.7
Teton	270	18.8	258	17.7	282	17.9
Pungo	263	18.7	334	19.7	261	19.0
Delus	263	19.4	228	20.7	106	18.4
Sebago	280	18.8	216	17.9	170	16.5
Plymouth	---	---	228	18.5	277	18.8
Cherokee	284	18.7	200	18.3	138	18.4
Saco	280	18.7	375	21.2	208	20.8
Kennebec	365	18.1	337	20.0	153	16.2
Merrimack	284	19.4	274	21.7	98	17.5
Chippewa	---	---	306	18.9	---	---

1/ 50% of U.S. No. 1.

2/ 75% of U.S. No. 1.

MASSACHUSETTS
Robert A. Mullany

1957 Potato Variety Tests

Four tests were planted in Eastern States territory in 1957; one in Massachusetts and three in widely scattered locations in Pennsylvania. Each planting was located in a commercial grower's potato field and, with the exception of planting, treated culturally as his own. Sprayer rows were not involved in these tests. The experimental design was the randomized complete block, with four replications at each location. Individual plots consisted of one 25-foot row with 10" spacing between plants, except as noted. The following paragraphs give test locations and the fertilizer and cropping practices followed by each cooperator:

The farm of Reid Wissler is located on heavy loam soil in the town of Ephrata in southeastern Pennsylvania. Potatoes were planted in 1955, followed by tobacco and a barley cover crop in 1956. Four hundred pounds per acre of ammonium sulfate was plowed down with a good growth of barley, and 1400 pounds per acre 5-10-5-2 was applied with the planter in 32-inch rows. The test was planted May 4, irrigated twice after midseason and harvested October 14.

The Fred Oswald farm is located in New Tripoli, in eastern Pennsylvania, and has a shaly loam soil. The previous year's crop was a clover-timothy mixture in a potato-wheat-hay rotation. Ten tons per acre of manure was plowed down, 800 pounds per acre 10-10-10 was applied with the planter in 34-inch rows, and 600 pounds per acre superphosphate was drilled after planting. The test was planted May 7 and harvested October 7.

Ebensburg, in western Pennsylvania, is the location of the farm of cooperator John Norman Griffith. The soil type is a heavy loam. Ten tons per acre of manure and 500 pounds per acre triple superphosphate was plowed down with a legume-timothy sod. One thousand pounds per acre 6-18-18 was applied with the planter in 34-inch rows. The planting date was May 21 and harvest date October 11.

The Williams Bros. farm, located in Old Deerfield, Massachusetts, has a sandy loam soil. Ten years of tobacco preceded the potato crop. A heavy ryegrass cover crop was plowed down and 1600 pounds per acre 8-12-12 was applied with the planter in 36-inch rows. The planting date was April 30, one irrigation was necessary, and the test was harvested October 2.

The weather conditions ranged from quite dry to extremely dry. Ebensburg had fairly good growing conditions, especially in regard to temperatures. The Oswald and Wissler tests experienced serious drought periods, which were partially offset at the latter location by two irrigations. As evidenced by the yields, growth conditions at the Oswald farm were extremely unfavorable, and the results are included only to show performance under these conditions.

All seed, except the Katahdin and Merrimack varieties, was supplied by the U.S.D.A. The Delus variety was tried at an 8-inch spacing as well as the 10-inch spacing, and where the moisture problem was not acute, some increase in yield resulted, though not significant. Delus quality was excellent and yields very good. However, the development of "leak" at the one location in Massachusetts may be an item of concern. The outstanding yields were made by Manota and B751-119 in the Williams' test, but under dry conditions in Pennsylvania both produced rough tubers and comparatively small yields. In addition, Manota sprouted considerably in the field. Merrimack and B355-35 displayed multiple minute cracking at two locations that might be associated with severe Rhizoctonia infection. For the third consecutive year a definite decrease in the yield of Katahdins is correlated with a higher Virus-X content.

The following tables contain data on total yields, yields of tubers over 1 7/8" free of off-shape, and dry matter content.

Eastern States table 1. -- Total Yield Per Acre

Variety	Farmer and State				Average
	Wissler	Oswald	Griffith	Williams	
	Pa.	Pa.	Pa.	Mass.	
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Boone	410	98	280	373	290
B355-35	411	82	240	402	284
Katahdin X-free	364	85	288	380	279
Manota	273	109	236	443	265
Delus 8"	328	84	281	349	260
B751-119	182	50	266	525	256
Delus 10"	345	93	270	305	253
Merrimack	356	66	269	310	250
Katahdin 46% X	267	92	234	374	242
Katahdin 83% X	292	84	195	354	231
B926-3	191	31	243	328	198
B2187-25	195	36	176	298	176

Eastern States table 2. -- Yield Per Acre Over 1 7/8^m - Free of Off-Shape

Variety	Farmer and State								Average	
	Wissler		Oswald		Griffith		Williams			
	Pa.		Pa.		Pa.		Mass.		Cwt.	Pct.
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
Boone	297	72	68	69	241	86	300	80	226	78
B355-35	284	69	52	63	207	86	341	85	221	78
Katahdin X-free	320	88	56	66	260	90	352	93	247	88
Manota	188	69	64	59	208	88	406	92	216	82
Delus 8 ^m	288	88	60	71	265	94	320	92	233	90
B751-119	116	64	22	44	231	87	472	90	210	82
Delus 10 ^m	290	84	72	77	255	94	274	90	223	88
Merrimack	219	62	39	59	226	84	267	86	188	75
Katahdin 46% X	229	88	62	67	215	92	342	91	212	88
Katahdin 83% X	252	86	55	65	169	87	327	92	201	87
B926-3	153	80	12	39	209	86	302	92	169	85
B2187-25	147	75	11	30	138	78	260	87	139	79
L.S.D. 5%	35		20		66		77		27	

Eastern States table 3. -- Dry-Matter Content

Variety	Farmer and State				Average*
	Wissler	Oswald	Griffith	Williams	
	Pa.	Pa.	Pa.	Pa.	Pct.
	Pct.	Pct.	Pct.	Pct.	
Boone	13.2	14.5	17.8	14.8	15.2
B355-35	15.0	16.4	21.1	16.0	17.4
Katahdin X-free	15.2	15.3	21.6	17.3	18.0
Manota	16.2	17.6	20.1	16.6	17.6
Delus 8 ^m	18.2	19.2	24.1	17.9	20.1
B751-119	16.6	18.6	21.7	17.9	18.7
Delus 10 ^m	19.0	19.4	23.8	17.7	20.2
Merrimack	17.3	17.9	21.3	17.3	18.6
Katahdin 46% X	15.7	15.6	22.1	16.4	18.1
Katahdin 83% X	15.7	15.2	22.3	16.8	18.3
B926-3	20.4	-	23.6	17.8	20.6
B2187-25	16.1	-	21.2	16.3	17.9
L.S.D. 5%	1.2	.71	1.2	.30	.63

* Includes 3 locations, Griffith, Williams and Wissler.

MICHIGAN

N. R. Thompson, D. R. Isleib, E. J. Wheeler
H. C. Moore and W. J. Hooker

In the potato-breeding program for 1957 seed was harvested from 47 controlled crosses and 7 self pollinations. The seed was stored for planting in June, 1958

Approximately 40,000 seeds were planted and screened for resistance to virus X and late blight. Survivors were transplanted to 3" pots in the greenhouse. The small tubers harvested in October will be planted in the scab nursery in 1958.

Seedling populations are grown at 3 locations in the State: Lake City Experiment Station, Lake City; Muck Experimental Farm, East Lansing; Upper Peninsula Experiment Station, Chatham (Michigan table 1.).

Michigan table 1. Distribution of seedlings.

Year Grown	Lake City	Muck	Upper Pen.
	No.	No.	No.
1st year seedlings	4827	2084	1744
2nd year seedlings	450	437	110
3rd year seedlings	75	61	14
Advanced seedlings	44	36	9

The most promising seedlings were planted in yield trials at East Lansing on mineral and organic soils. The seedlings were planted in randomized blocks with the over-State yield trials at East Lansing.

Michigan table 2. Yield of trials, East Lansing, 1957.

Variety	U.S. No.1/A.		Total Solids	Pedi- gree No.	U.S.No.1/A.		Total Solids
	Bu.	Pct.			Bu.	Pct.	
<u>Mineral Soil</u>							
Russet Rural	650	95	18.8	1111-5	656	94	18.8
139-9	626	97	17.2	1109-9	602	97	18.8
Huron	599	89	19.2	1111-8	581	93	19.7
Sebago	559	94	17.2	472-13	505	89	17.0
Katahdin	528	95	17.0	1111-20	454	90	18.2
Onaway	514	89	17.5	1092-2	424	92	17.6
Merrimack	503	88	19.8	1106-4	408	91	19.8
Cherokee	450	92	17.1	1152-1	396	92	16.6
Tawa	356	90	17.1	1037-1	381	89	18.5
Delus	348	96	19.0	1157-2	293	90	18.2
				1106-5	181	86	19.2
				1111-16	127	96	19.2

Variety	U.S.No. 1/A.		Total Solids Pct.	Pedi- gree No.	U.S.No.1/A.		Total Solids Pct.
	Bu.	Pct.			Bu.	Pct.	
<u>Organic Soil</u>							
Sebago	885	92	14.9	1111-5	1397	94	16.1
Onaway	798	92	15.5	1107-3	1057	95	14.8
Huron	770	90	15.8	1058-2	1037	94	14.0
Rus. Rural	603	88	15.6	1106-4	1031	91	16.5
Merrimack	559	92	17.0	1073-1	1009	90	15.1
Cherokee	563	90	16.5	1037-1	922	93	13.9
Tawa	566	87	15.1	1157-2	868	88	14.7
139-9	555	94	14.9	912-6	787	92	14.7
Katahdin	523	77	14.9	1152-1	706	94	14.7
Delus	505	95	17.5	1111-8	704	95	17.3
				1106-5	486	89	16.6
				1109-9	421	94	15.6

Six seed lots of S. tuberosum and three of S. acaule were tested for immunity to virus X. The seedlings were transplanted into 3-inch pots. After recovery from transplanting, the seedlings were mechanically inoculated with Virus X (isolate strain X5). Visual readings were followed by serological tests (chloroplast agglutination method) (See Mich. table 3). Clones exhibiting immunity have been planted for crossing and selfing.

Michigan table 3. Immunity test for virus X.^{1/}

Progeny resistance and parentage	Plants Inoculated	Visual symptoms ^{2/}		Serological test of symptomless plants ^{3/}		
		Healthy	Infected	Tested	Virus	
					free	Infected
	No.	No.	No.	No.	No.	No.
MS 561 sc., L.B., Xi. (Ac 25668 x 11107-4)	101	60	41	12	12	0
MS 568 L. r., B 24-58 (X)	8	0	8	0	--	-
MS 569 s.c., L.b., Xi. Ia 902-2 (X)	41	22	19	7	7	0
MS 570 S.c., L.b., Xi. Ia 902-3 (X)	28	17	11	3	3	0
MS 571 sc., L.b., Xi. Ia 902-7 (X)	68	47	21	40	40	-
MS 577 Sc., L.b., Xi. Ia 1114-2 (X)	80	69	11	32	31	1
MS 581 Xi. PI 230-554 (X)	48	48	0	48	48	0
<u>S. acaule</u> MS 582 Xi. PI 230-531 (X)	22	19	3	19	19	0
<u>S. acaule</u> x Kat. (Recoba) MS 583 Xi. PI 230-556 (X)	58	13	45	13	13	0
<u>S. acaule</u>						

1/ Mechanical inoculation of seedling transplanted 9/12/56, 9/14/56 and 9/22/56 with isolate X5. Each plant individually rubbed.

2/ Mechanical inoculation of plants in 2nd tuber generation 3/14/57, 3/19/57 and 3/21/57 with isolate X5.

3/ Serological (chloroplast agglutination test 4/17/57.

Total solids in varieties and seedlings as effected by levels of irrigation. Potatoes were planted at Lake City on a sandy loam soil supplied with 1,000 pounds of a 5-20-20 analysis fertilizer per acre. On July 8 a rainfall of 6.7 inches was the last substantial percipitation of the summer. The remainder of the growing season had deficient moisture. Many growers are reluctant to irrigate sufficiently to produce a maximum yield. They have been informed from many sources that such a practice will lower the total solids of the potatoes. In the experiment the varieties and seedlings varied in the total solids but in no single instance was the total solids decreased appreciably because of the additional water applied. In many cases a slight improvement in total solids was evident.

Michigan table 4. Total solids in irrigated and non-irrigated potatoes, 1957.

Varieties & Seedlings	No Irrigation	Irrigation ^{1/}		Varieties & Seedlings	No Irrigation	Irrigation ^{1/}	
		2" Per	4" Per			2" Per	4" Per
	Pct.	Week Total Solids	Week Total Solids		Pct.	Week Total Solids	Week Total Solids
Sebago	18.4	18.8	17.6	Chippewa	16.8	18.0	17.0
Red Pontiac	15.8	17.4	16.6	Cherokee	19.2	18.8	18.8
Katahdin	18.2	18.0	17.6	B515-5	16.6	16.6	15.4
Gr. Mountain	20.6	21.0	20.4	B355-54	17.8	17.4	17.6
Russet Burbank	18.0	18.8	18.6	R133-9	15.4	15.8	15.8
Sequoia	19.0	18.4	19.4	R139-9	18.4	18.2	19.0
Onaway	17.6	17.0	17.0	R42	18.2	17.4	17.6
Russet Rural	20.0	19.8	20.6	R140-1	15.8	15.8	15.4
				1747-5	16.2	16.4	17.2

^{1/} The irrigation water was added to supplement the normal rainfall to either 2 or 4 inches.

Leaf roll resistance. Seedling potatoes were exposed to leaf roll infection at the 4 to 6 leaf stage following transplanting to 3-inch pots. Viruliferous aphids from leaf roll infected Datura stramonium were transferred to seedling plants and allowed to grow on the seedling plants almost to the time the plants had matured. Seedlings were examined for evidence of leaf roll and those visibly infected were discarded. One tuber from each plant saved was planted in the field the following year with plants with leaf roll symptoms were discarded (Mich. table 5). First trials were made using resistance from X927-3. Under conditions of the test few resistant survivors were obtained. The following year, 1955, (Mich. table 6) resistance of X927-3 was again used. The number of survivors in certain of these crosses was somewhat higher than those from the inoculation of the previous year.

A second group of crosses was tested in 1955 (Mich. table 7) from seed lots given us by Dr. F. J. Stevenson. The degree of exposure of these seedlings may have been somewhat less than that of the previous group of seedlings (Mich. table 6) as temperatures in the insect cages were relatively low in October. These plants were grown to maturity in the greenhouse. The number of plants surviving this inoculation was considerably higher than from

previous tests suggesting that the resistance incorporated in these crosses might be of more use to the breeding program than that used in earlier tests. In certain cases the number of clonal lines grown in 1957 was higher than that reported for 1956. This was due to an error in harvesting in which all tubers of healthy plants were harvested rather than one tuber from each pot.

In each test inoculation was made during the seedling stage. Leaf roll symptoms developed in subsequent tuber generations. In 1958, all progenies will be exposed to a second leaf roll inoculation before planting.

Mich. table 5. Leaf roll infection of potato progenies segregating for resistance as determined by exposing small seedling plants to infection using heavy populations of M. persicae.

Pedigree Numbers	Parentage	1954		1955		1956		1957	
		Plants inoculated	Healthy plants saved	Clonal lines grown	Healthy plants saved	Clonal lines grown	Healthy plants saved	Clonal lines grown	Healthy plants saved
		No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Ia 1301	B606-67 x B2903-17	4	0	--	--	--	--	--	--
Ia 1303	Ia 801-10 x Ia 1077-16	97	2.1	2	100	3	0	--	--
Ia 1307	B 595076 x B 2903-17	54	14.8	7	28.6	2	0	--	--
Ia 1311	B2875-8 x (X927-3)	59	33.9	2	50.0	--	--	--	--
Ia 1315	B2875-8 x B2903-17	101	10.9	11	18.2	2	0	--	--
Ia 1332	(X927-3) x B991-3	83	16.9	13	23.1	2	100.0	2	50.0
Ia 1333	X927-3 x Ia1077-3	81	17.3	14	85.7	12	41.7	5	60.0
Ia 1334	X927-3 x Ia1077-12	44	15.9	6	33.3	2	0	--	-----
Ia 1335	X927-3 x Ia 1087-1	80	12.5	10	40.0	5	40.0	2	100.0
Ia 1336	X927-3 x B2903-17	74	32.4	23	26.1	6	33.3	2	50.0
Ia 1344	B2903-17 selfed	20	0	--	-----	--	-----	--	-----
Ia 1345	B2903-17 x Ia 1077-3	43	9.3	4	0	--	-----	--	-----
Ia 1347	6316 x B2903-17	57	22.8	13	23.1	--	-----	--	-----
Ia 1349	PI 194665 x B2003-17	23	100.0	23	26.1	6	33.3	2	100
Ia 1355	X927-3 x Ia 1077-16	69	20.3	13	23.1	3	0	--	-----
Ia 1360	B2903-17 x Ia 1077-16	97	24.7	24	50.0	10	10.0	--	-----

Mich. table 6. Leaf roll infection of potato progenies segregating for resistance as determined by exposing small seedling plants to infection using heavy populations of M. persicae.

		1955		July 1956		October 1956		1957	
Pedigree Number	Parentage	Plants inocu- lated	Healthy plants saved	Clonal lines grown	Healthy plants saved	Clonal lines grown	Healthy plants saved	Clonal lines grown	Healthy plants saved
		No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
MS 401	B926-9 x(X927-3)	27	18.5	25	32.0	13	84.6	11	11
MS 461	X927-3 x Ia 902-2	472	25.8	156	19.2	30	83.3	10	100.0
MS 462	X927-3 x Ia902-3	782	38.2	397	21.2	82	79.3	29	69.0
MS 463	X927-3 x Ia1106-1	535	38.1	209	49.8	97	77.3	32	56.3
MS 464	X927-3 x Ia1107-4	345	20.9	145	10.3	16	93.8	3	100.0
MS 465	X927-3 x B3131-8	114	27.2	53	28.3	13	46.2	1	100.0
MS 466	X927-3 x B2903-17	497	25.3	338	13.6	45	44.4	3	33.3
MS 467	X927-3 x Ia1049-3	1053	21.4	265	26.0	67	59.7	12	25.0
MS 469	X927-3 x Ia1077-W5	310	37.4	279	12.9	35	85.7	10	60.0
MS 470	X927-3 x Osage	64	59.4	49	12.2	6	83.3	2	50.0
MS 471	X927-3 x Ia781-7	85	43.5	44	9.1	4	75.0	1	0
MS 472	B2903-17 x Ia902-2	4	0						
MS 475	B2903-17 x Ia1107-4	9	0						
MS 476	B2903-17 x Ia1077-W5	23	0						

Mich. table 7. Leaf roll infection of potato progenies segregating for resistance as determined by exposing small seedling plants to infection using heavy populations of M. persicae.

		1955		1956		1957	
Pedigree Number	Parentage	Plants inocu- lated	Healthy plants saved	Clonal lines grown	Healthy plants saved	Clonal lines grown	Healthy plants saved
		No.	Pct.	No.	Pct.	No.	Pct.
B 1491	B24-58 selfed	66	92.4	1	100.0	11	11
B 1492	B294-38 selfed	113	77.9	36	41.7	44	4.5
B 4055	Aquila x Cherokee	85	90.5	14	28.6	9	0.0
B 4056	Erlaine x(X927-3)	65	86.1	29	48.3	34	14.7
B 4057	Houma x Katahdin	92	89.1	4	25.0	2	0.0
B 4058	Houma x B24-58	92	94.5	43	83.7	70	47.1
B 4059	Houma x B294-38	60	93.3	43	69.8	58	12.1
B 4060	Houma x(X792-94)	45	100.0	39	82.1	79	3.8
B 4061	Katahdin x B24-58	91	68.1	18	88.9	33	54.5
B 4062	B24-58 x B953-3	91	69.2	38	68.4	55	20.0
B 4063	B24-58 x B2834-3	65	72.3	6	100.0	7	14.3
B 4064	B24-58 x B2963-7	108	55.5	92	77.2	11	11
B 4065	B294-38 x Cherokee	109	69.7	68	38.2	49	2.0
B 4066	B294-38 x(X528-170)	55	90.1	60	60.0	73	12.3

continued

Mich. table 7 continued.

Pedigree Number	Parentage	1955		1956		1957	
		Plants inocu- lated	Healthy plants saved	Clonal lines grown	Healthy plants saved	Clonal lines grown	Healthy plants saved
		No.	Pct.	No.	Pct.	No.	Pct.
B 4067	ND 457-1 x B294-38	97	36.1	--	--	--	--
B 4068	ND457-1 x B2067-52	88	72.7	12	33.3	6	0.0
B 4069	B595-76 x B294-38	66	86.3	28	28.6	12	0.0
B 4070	(X927-3) x Katahdin	86	94.2	38	55.3	35	22.9
B 4071	(X927-3) x B24-58	91	83.5	13	61.5	--	--
B 4072	(X927-3) x B2938-22	110	90.0	7	14.3	3	0.0
B 4073	(X927-3) x B2963-7	110	95.4	101	53.5	71	14.1
B 4074	B2925-23 x B24-58	44	47.7	--	----	42	47.6
B 4101		--	----	75	70.7	54	1.8

Uniform Potato Scab Nursery
E. J. Wheeler

The date for the uniform scab nursery test is presented in Michigan table 8. Most of the Chippewa checks showed pustule types of 4 and 5. Seedlings B3114-52, B3172-13, B3454 and B 3897-4 were about as susceptible to scab in Michigan as the check but many of the seedlings indicated a very high degree of resistance with only a trace of 1 pustule showing in 2 replications.

Michigan table 8. Uniform scab nursey test, Michigan 1957.

	Replication 1				Replication 2				
Seedling or Variety	Seedling		Check ^{3/}		Seedling		Check		Skin Color
	Area ^{1/}	Type ^{2/}	Area	Type	Area	Type	Area	Type	
Cherokee	1	1	1	4	2	2	2	4	White
La 1859	1	3	-	-	T	1	1	4	l. red
B 2162-36	T	1	2	4	T	1	2	4	l. red
B 2368-13	T	1	2	4	1	2	3	5	l. red
B 2874-4	T	1	2	4	T	1	T	3	l. red
B 2922-26	1	3	1	4	1	3	1	3	Russet
B 3114-52	1	3	2	4	1	4	2	5	White
B 3172-13	1	2	3	4	2	5	3	5	White
B 3309-2	1	1	3	4	T	2	-	-	m. red
B 3309-4	T	1	-	-	T	1	1	4	m. red
B 3319-30	T	2	1	4	T	1	2	4	White
B 3453-2	T	1	1	5	T	1	T	4	m. red
B 3454-5	T	1	1	5	1	5	1	5	m. red
B 3454-14	T	1	2	4	T	2	2	5	m. red
B 3627 ND	1	2	1	2	1	2	1	4	White

continued

Mich. table 8 continued.

	Replication 1				Replication 2					
Seedling or Variety	<u>Seedling</u>		<u>Check</u> ^{3/}		<u>Seedling</u>		<u>Check</u>		Skin Color	
	<u>Area</u> ^{1/}	<u>Type</u> ^{2/}	<u>Area</u>	<u>Type</u>	<u>Area</u>	<u>Type</u>	<u>Area</u>	<u>Type</u>		
B 3832-20	T	1	1	4	T	1	1	4	White	
B 3837-11	T	1	1	4	T	1	T	2	White	
B 3849-10	2	3	2	4	2	3	1	5	White	
B 3857-11	1	2	1	4	2	2	2	4	White	
B 3871-6	T	1	1	4	T	1	2	4	White	
B 3876-25	T	1	3	5	T	2	2	5	White	
B 3897-4	T	1	1	4	1	4	2	4	m. red	
B 3897-9	1	1	2	4	-	-	-	-	m. red	
B 3897-11	T	1	1	4	T	1	1	4	m. red	
B 3903-1	T	1	2	4	1	2	1	4	m. red	
B 3964-1	1	2	2	5	1	2	-	-	White	

1/ Surface area covered:

T= Less than 1%

1= 1 to 20%

2= 21 to 40%

3= 41 to 60%

2/ Type of pustule:

1= small, superficial

2= Large but still superficial

3= Large rough pustules

4= Large rough pustules, pitted

5= Large, rough pustules, deeply pitted

3/ Check = Chippewa

MINNESOTA

Department of Horticulture: F. A. Krantz and F. I. Lauer
Department of Plant Pathology: Carl J. Eide, H. D. Thurston
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The potato-breeding work was continued in 1957 along essentially the same lines as described in previous reports. This report deals with (1) measurement of field resistance to late blight, (2) aggressiveness of the pathogen and field resistance to late blight, (3) inheritance of scab resistance, and (4) reaction of U.S.D.A. selections to common scab.

Measurement of Field Resistance to Late Blight. Replicated 20-hill rows of 10 varieties and selections of potatoes were planted at St. Paul and one plant in the middle of each row inoculated with race 0 of Phytophthora infestans in July. None of the clones had major genes for resistance. This was done in an attempt to measure varietal differences in the rate of spread of the fungus as a factor in field resistance. The final defoliation notes given in Minnesota table 1 indicate some differences between varieties, but the rate of spread was difficult to distinguish from other factors affecting the prevalence of the disease.

Minnesota table 1. Range in percent of defoliation in 20-hill rows of potatoes inoculated near the middle of each row.

Clone	Defoliation in percent	Clone	Defoliation in percent
272.51-52	Trace	President	10 to 50
112.49-6	Trace to 10	Ostbote	10 to 50
135.49-3	Trace to 10	Sebago	50 to 100
136.49-4	Trace to 10	Cobbler	90 to 100
135.49-10	Trace to 20	M - 12	90 to 100

In the greenhouse detached leaves of several clones of diverse field resistance were inoculated as uniformly as possible to measure resistance to penetration, but the results varied widely and indicated a need for more precise inoculation techniques.

Aggressiveness of the Pathogen and Field Resistance to Late Blight. A screening test of 1145 advanced selections, 963 new selections, 188 selfed clones, and susceptible checks was made at Castle Danger to test field resistance to late blight. The test included clones with various combinations of R0, R1, R2, and R4 immunity genes. Inoculation in the field with an isolate of race 1, 2, 4, resulted in a good initial infection, a couple of periods of weather apparently favorable for blight occurred, but no epidemic permitting the differentiation of clones for field resistance occurred.

In a comparison with isolates of several other races in the field at Rosemount, 1, 2, 4 proved to be very nonaggressive. That this is not necessarily a characteristic of certain "major gene" races is shown by the fact that the isolate of race 0 in the test at Rosemount also spread very slowly.

In another test at St. Paul, single plants of the Cobbler variety near the center of a plot of that variety about 125 x 60 feet were inoculated with races 1 and 4. The fungus spread from these inoculated plants, eventually infecting heavily all of the Cobbler plants in the plot. Scattered plants with R₁ and R₄ genes were only slightly infected. Twenty of 23 isolates from the Cobbler plants in the field proved to be race 0. The probability that this race came from a source outside of the plot seems unlikely, but if it did, it certainly was much more aggressive than the isolates of 1 and 4 with which the plot was inoculated.

Inheritance of Scab Resistance. With few exceptions, progenies grown are derived from parents possessing scab resistance in one or both of the parents. First year seedling progenies are reduced by selection for characters other than scab resistance at Castle Danger, Minnesota. In subsequent years these are placed in screening tests including a 3-hill row of each selection for testing scab resistance at Grand Rapids, Minnesota. Variability in scab infestation in the plot is measured by an Irish Cobbler check hill at one end of each 3-hill test row.

The scab resistance of the parent clones was estimated on the basis of the most severe reading obtained in several years' tests. This accounts for the absence of parents with a resistance rating of type 1. Parents having clonal reactions of type 5 were separated into two groups: (1) those derived from parents with and (2) without scab resistance. The scab resistance of the segregating progenies reported here are based on one year's testing.

The following study was made to determine (1) the relation of scab resistance in the progenies to the clonal resistance of the parents; (2) the breeding behavior and combining ability of parents with varying degrees of scab resistance.

The breeding behavior for scab resistance of seven parents clones was studied by testing their selfed and some crossed progenies. Four parents had clonal reactions to scab of type 2 while the remaining three had ratings of 3, 4, and 5 respectively. It will be seen from the data in Minnesota table 2 that the relation of the clonal reaction of the parents to their selfed progenies was good for all parents except M804. The selfed progenies from parents with clonal reactions of type 2 possessed lower mean scab indices and higher percentages of clones with indices of 2 or less than those from type 3 and 4 parents. Parent clone M804 apparently represents a special case. Pitted scab (type 5) has occurred on this parent; however, the segregation of its selfed progeny suggests a higher degree of scab resistance.

The frequency distributions for selfed progenies from 528-170, 81 and 83 indicate that these parents are not homozygous for scab resistance. For 45.47-1-50, there is a suggestion of homozygosity although the small population precludes a definite statement. Nevertheless, the scab resistance of its hybrid progenies tends to be higher than that of comparable crosses involving the other type 2 parent clones.

Minnesota table 2. Reaction to common scab of parents and their selfed and hybrid progenies.

Parents	Types of Parental Resistance	Seedling Clones Tested	Number of Seedling Clones in Indicated Classes of Scab Resistance					Mean Scab Index	Seedling Clones with Index of 2 or less
			No.	1	2	3	4	5	Pct.
528-170 (X)	2	28	6	18	1	2	1	2.07	86
and 15-2-10-1-2	2 and 52/	51		9	11	15	16	3.75	18
and 15-2-10-1-12	2 and 52/	4		1	1	1	1	3.50	25
and 15-2-10	2 and 52/	4				1	3	4.75	0
and 50-5-2	2 and 52/	12		1	2	2	7	4.25	8
45.47-1-50 (X)	2	4	4					1.00	100
and 83	2 and 2	9	5	4				1.44	100
and 50.49-7-51	2 and 2	9	5	2	2			1.67	78
and Waseca	2 and 52/	10	1	4	3	2		2.60	50
and ND888-8-IR	2 and 52/	9	1		2	2	4	3.89	11
81 (X)	2	11	5	2	3	1		2.00	64
and M1	2 and 3	8	1	4	3			2.25	63
and 85	2 and 4	27		13	6	8		2.81	48
and M20	2 and 52/	12	2	1	1	3	5	3.67	25
and 28-1-1-12	2 and 52/	5		1	1	2	1	3.60	20
and B922-6	2 and 52/	6		1	3	1	1	3.33	17
83 (X)	2	8	2	2	3	1		2.38	50
and 45.47-1-50	2 and 2	9	5	4				1.44	100
82 (X)	3	44	9	12	13	3	7	2.70	48
and 61-3-10	3 and 2	6	4	1			1	1.83	83
and 43.46-5-48	3 and 3	7	1	2	4			2.43	43
85 (X)	4	13	1	2	3	1	6	3.69	23
and 81	4 and 2	27		13	6	8		2.81	48
and M1	4 and 2	10	1	5	2	2		2.50	60
and 61-3-5	4 and 4	15		1	4	4	6	4.00	7
and 6364	4 and 4	24	1	8	6	1	8	3.29	38
and 113-1-15	4 and 5	19	1	6	4	3	5	3.26	37
and M804	4 and 5	19		4	3	4	8	3.84	21
M804 (X)	5	12	3	6	2	1		2.08	75
and 26.47-3-50	5 and 2	24	2	15	1	2	4	2.63	71
and 24.48-4-50	5 and 3	24		5	4	1	14	4.00	21
and 85	5 and 4	19		4	3	4	8	3.84	21
and 77.41-1-43	5 and 5	21				2	19	4.90	0
and Waseca	5 and 52/	5					5	5.00	0

- 1/ Type estimated by thickness of leison; 1, very small and superficial; 4, thickest corky-type leison; 5, pit scab.
 2/ Clones with no scab resistant parentage.

The general combining ability for scab resistance of 925 first-year selections from 86 progenies tested over a three-year period, 1955-57, is summarized in Minnesota table 3. The crosses from parents with the same clonal resistance are combined and include parental combinations having clonal reactions to scab ranging from 2 to 5 inclusive. Here, as for specific parents above, differences in scab resistance of the clonal parents are reflected in their hybrid progenies and distinct genetic differences are evident between parental classes. Progenies derived from parents clones with low scab indices possessed the lowest mean scab indices and the highest percentages of clones with indices of 2 or less. Parents with resistance of type 2 in comparison to type 3 transmitted scab resistance to a greater degree when crossed with less resistant clones. Parents with scab indices of 3 or more showed no appreciable difference. The most susceptible class 5 indicate genotypes with resistant genes when descended from resistant parents, and few if any resistant genes where ancestry has given no evidence of scab resistance.

Minnesota table 3. Reaction to common scab of parents and their progenies.

Types of parental resistance ^{1/}	Progenies No.	Seedling clones tested No.	Number of seedling clones in indicated classes of scab resistance					Mean scab index	Seedling clones with index of 2 or less	Check clones with index of 5 ^{2/}
			1	2	3	4	5		Pct.	Pct.
2 and 2	13	143	43	60	22	15	3	2.13	72	91
2 and 3	7	65	16	29	12	5	3	2.23	69	92
2 and 4	5	53	4	22	11	13	3	2.79	49	96
2 and 5	2	29	2	16	1	5	5	2.83	62	100
2 and 5 ^{3/}	28	275	10	41	72	70	82	3.63	19	93
3 and 3	4	64	13	19	20	5	7	2.59	50	94
3 and 4	3	23		1	1	7	14	4.48	4	100
3 and 5	2	44		11	8	5	20	3.77	25	100
3 and 5 ^{3/}	7	66	4	11	6	14	31	3.86	23	97
4 and 4	3	52	2	11	13	6	20	3.60	25	94
4 and 5	2	38	1	10	7	7	13	3.55	29	100
4 and 5 ^{3/}	3	13				2	11	4.85	0	100
5 and 5	3	37	3	6	2	4	22	3.97	24	97
5 and 5 ^{3/}	4	23			2	4	17	4.65	0	96

^{1/} Type estimated by thickness of lesion; 1, very small and superficial; 4, thickest corky-type lesion; 5, pit scab.

^{2/} Irish Cobbler check at one end of each 3-hill test row.

^{3/} Clones with no scab resistant parentage.

Reaction of U.S.D.A. Selections to Common Scab. One of the uniform scab nurseries sent by the U.S.D.A. to a number of State Experiment Stations was also tested for scab resistance at Grand Rapids, Minnesota. The data for this test are given in Minnesota table 4.

Minnesota table 4. Reaction of U.S.D.A. selections to common scab at North Central Experiment Station, Grand Rapids, Minnesota, 1957.

Selection	Common Scab Rating			
	Selection		Check ^{3/}	
	Severity ^{1/}	Coverage ^{2/}	Severity ^{1/}	Coverage ^{2/}
B 2162-36	1	T	5	H
B 2368-13	3	H	5	H
B 2874-4	5	T	5	H
B 2922-26	5	H	5	H
B 3114-52	5	H	5	H
B 3172-13	5	H	5	H
B 3309-2	5	M	5	H
B 3309-4	2	L	5	M
B 3319-30	5	M	5	H
B 3453-2	1	T	5	M
B 3454-5	3	L	5	M
B 3454-14	-	-	4	L
B 3627-ND	5	M	5	M
B 3832-20	5	M	5	M
B 3837-11	5	H	5	H
B 3849-10	3	M	5	H
B 3857-11	4	M	5	H
B 3871-6	3	M	5	M
B 3876-25	4	L	5	L
B 3897-4	5	H	5	H
B 3897-9	2	L	5	H
B 3897-11	4	M	5	H
B 3903-1	4	L	5	H
B 3964-1	3	H	5	H
Cherokee	2	L	5	H
La 1859	4	H	5	H

^{1/} Severity estimated by thickness of lesion; 1, very small and superficial; 4, thickest corky-type lesion; 5, pit scab.

^{2/} Trace, less than 1% of tuber area covered; L, 1 to 20%; M, 21 to 40%; H, over 40%.

^{3/} Irish Cobbler check at one end of each 3-hill test row.

MINNESOTA
Orrin C. Turnquist

Potato Variety Trials

In 1957, the Agricultural Extension Service of the University of Minnesota conducted potato variety trials at six locations in the State. These plots were grown in cooperation with commercial growers, county agricultural agents, branch experiment stations and the certified seed department. The purpose of these plots is to familiarize the grower with new varieties and to assist him in evaluating the varieties for use in his area.

This past season the plots were located at Baker, Crookston, and Oslo on the heavy soils of the Red River Valley. A plot was grown in north central Minnesota on the lighter soil at Grand Rapids. An irrigated plot was located in the early market section of the Twin Cities. The plot at Hollandale was grown on peat soil. One hundred pounds of seed of each variety was planted in a double row with a commercial planter. The plots were laid out in a randomized block design in the growers commercial field of potatoes and replicated twice. At harvest, the potatoes from a rod row within the double row of each variety were weighed and graded for size. Samples from each plot were taken for specific gravity determinations and chipping tests.

The total yield, percent U. S. No. 1 size and dry matter for 3 locations in the Red River Valley are presented in Turnquist table 1. The performance of varieties tested at Grand Rapids, Osseo and Hollandale is presented in Turnquist tables 2, 3, and 4 respectively.

The new variety Antigo appeared very promising in yield, but tubers were inclined to be fairly rough and irregular. It showed no scab or skin russetting. It was particularly well adapted to the peat soil at Hollandale.

The varieties Tawa and Norland averaged fairly low in yield, but tuber quality was excellent at all locations. Very little growth cracking and hollow heart was observed in Tawa in 1957. It appeared outstanding at Hollandale on the peat soil.

Norland (ND 2906-1) produced extremely smooth tubers with a good distribution of shallow eyes. It was as early as Waseca and Early Gem and had an attractive red color. It appeared to be more tolerant to scab and russetting than Red Pontiac and Waseca. Chipping quality of Norland was very good.

Plymouth was tested for the first time at all locations except Osseo. Tubers were misshapen and flat. Appearance was very poor and it was one of the poorest yielders in the trials.

Turnquist table 1. Performance of potato varieties in Red River Valley demonstration plots, 1957.

Variety	Oslo			Baker			Crookston			Average		
	Total		Dry Mat-ter	Total		Dry Mat-ter	Total		Dry Mat-ter	Total		Dry Mat-ter
	Yield	No.1 Size		Yield	No.1 Size		Yield	No.1 Size		Yield	No.1 Size	
Irish Cobbler	Cwt. 212	Pct. 98	Pct. 20.4	Cwt. 187	Pct. 94	Pct. 21.2	Cwt. 229	Pct. 92	Pct. 22.5	Cwt. 209	Pct. 95	Pct. 21.4
Antigo	167	98	19.1	188	94	20.4	243	94	21.0	199	95	20.2
Kennebec	163	96	18.3	171	96	21.0	228	88	20.0	187	90	19.8
Red Pontiac	195	98	16.8	152	91	18.9	207	95	20.0	185	95	18.6
Cherokee	184	96	19.5	142	92	22.3	221	96	21.4	182	95	21.1
Minn. 11	161	95	17.0	178	87	19.1	195	94	20.6	178	89	18.9
Manota	140	94	20.4	182	95	20.6	196	94	20.6	173	94	20.5
Early Gem	178	97	17.7	108	80	18.7	205	94	19.3	164	90	18.6
Dazoc	164	94	18.1	154	75	20.8	166	87	20.6	161	85	19.8
Redburt	163	95	19.5	132	79	19.1	173	94	18.9	156	89	19.2
Waseca	162	97	19.5	134	89	19.3	149	93	19.5	148	93	19.4
Tawa	160	97	20.2	131	90	21.0	145	90	20.8	145	92	20.7
Norland	122	96	18.9	158	94	19.5	153	92	19.3	144	94	19.2
Red LaSoda	156	95	17.2	117	81	19.1	-	-	-	136	88	18.2
Russet Burbank	129	93	19.3	91	50	22.5	187	91	21.7	136	78	21.2
Plymouth	142	96	19.1	72	89	20.2	172	86	19.8	129	90	19.7
Average	162		18.8	144		20.2	191		19.1	164		19.8
I.S.D. at 5%	45			22			63					

Cooperators: Oslo, Minn.; Earl Mallinger; Baker, Minn.; Forrest Thompson; Crookston, Minn., Northwest Experiment Station, B. C. Beresford.

Turnquist table 2. Performance of potato varieties at Grand Rapids, Minnesota, 1957.

Variety	Total Yield	No.1 Size	Dry Matter
	Cwt.	Pct.	Pct.
Kennebec	317	96	19.8
Minn. 11	298	91	20.0
Russet Burbank	295	89	21.7
Early Gem	284	93	19.3
Cherokee	275	90	21.7
Irish Cobbler	270	87	20.4
Waseca	230	89	17.9
Osseo	215	93	19.1
Redburt	209	87	18.1
Tawa	202	91	19.3
Red Pontiac	199	90	17.0
Antigo	195	90	19.3
Plymouth	189	93	20.0
Dazoc	183	89	20.2

Average 240 19.6
L.S.D. 5% 34

Cooperator: North Central Expt. Station - Nils Grimsbo.

Turnquist table 3. Performance of potato varieties at Osseo, Minnesota, 1957.

Variety	Total Yield	No.1 Size	Dry Matter
	Cwt.	Pct.	Pct.
Kennebec	316	93	17.7
Minn. 11	308	85	15.1
Red LaSoda	284	92	15.1
Red Pontiac	269	87	14.7
Cherokee	262	82	18.1
Redburt	243	88	16.4
Dazoc	240	84	17.4
Irish Cobbler	235	82	17.7
Early Gem	229	90	16.2
Waseca	221	91	15.3
Russet Burbank	212	84	19.1
P 40	204	80	16.0
Tawa	184	85	17.4

Average 247 16.6
L.S.D. 5% 38

Cooperator: Ed Shimek, Rt. 1, Osseo, Minnesota.

Turnquist table 4. Performance of potato varieties at Hollandale, Minnesota, 1957.

Variety	Total Yield	No.1 Size	Dry Matter
	Cwt.	Pct.	Pct.
Red Pontiac	335	96	14.5
Antigo	309	97	17.2
Irish Cobbler	308	93	17.4
Minn. 11	297	92	16.6
P - 13	296	91	16.6
Tawa	292	96	18.5
Waseca	255	92	14.9
Redburt	223	94	16.8

Average 239 16.6
L.S.D. 5% 66

Cooperator: Southern Minn. Veg. Growers.

MISSISSIPPI
W. S. Anderson

Five varieties were planted with seed procured from Nebraska. These were planted February 15 on soil classified as Kaufman fine sandy loam. The land had been prepared by disking, plowing and bedding on February 12 when 6-8-8 fertilizer was applied side-placed both sides of the ridge at 1800 pounds per acre. The seedpieces were spaced 10 inches apart in rows $3\frac{1}{2}$ feet apart. On March 28, 900 pounds per acre of 6-8-8 were applied as a side dressing. Sprays of Dithane Z-78 and Cryolite were applied April 1 and April 15. Irrigation was applied with sprinklers at a rate approximating one-acre-inch on April 16, May 9, and May 18. In general, the temperatures during the season were favorable for Irish potatoes and good yields were made.

Adjacent to the planting of named varieties and grown in the same way, were planted 12 numbered seedling selections supplied by Dr. T. P. Dykstra with seed produced at Crossville, Tennessee, and kept in cold storage since August 17, 1956. These were planted in 2 or 3 replications with one exception where only enough tubers were available for a single row 25 feet long.

Miss. table 1 below shows the data collected from this test. The three red-skinned varieties out-yielded the two white ones by considerable amounts of No. 1 tubers. They were also earlier in maturing than the white ones. Since Red La Soda has a darker and more attractive color than its parent La Soda and since it yields as well, this strain is to be preferred when seed can be had. Red Pontiac is usually not as smooth, nor as attractive as the La Soda but may be considered a week earlier in maturity. It should be pointed out that both Kennebec and Katahdin were immature at harvest and these could have increased in yield, given two more weeks of growth unless stopped by hot weather.

The data show that several of the seedlings made excellent yields, ranging up to 208 bushels per acre for 6,077 which produced large, well-shaped, red-skinned tubers. Other very promising seedlings were 6,603, red-skinned and well-shaped; 6088, dark-red and well-shaped; and 1859, light pink and long in shape. Unfortunately, the seedlings having the highest specific gravity, indicating the best quality, were the lowest yielding ones in this test. Undoubtedly, the six highest yielding seedlings should be re-tested; and, if possible, additional tests should include seed grown in the western States.

Miss. Table 1. - Irish Potato Varieties, 1957, Mississippi State College

Variety	Yield Per Acre			Solids Pct.	Maturity
	U.S.No.1	Others	Specific		
	(60 lbs.) Bu.	(60 lbs.) Bu.	Gravity		
Red Pontiac (6)*	311	71	1.060	15.3	Early
Red La Soda (7)	309	55	1.058	14.9	Medium early
La Soda (6)	292	54	1.060	15.3	Medium early
Katahdin (5)	237	100	1.070	17.5	Late
Kennebec (6)	225	65	1.071	17.7	Very late
6077	208	51	1.074	18.4	Late
6603	177	76	1.059	15.1	Early
6088	176	90	1.065	16.5	Early
1859	161	41	1.066	16.7	Very early
4112	118	46	1.069	17.4	Late
4819	106	54	1.075	18.6	Late
5347	86	43	1.070	17.5	Early
5310	83	119	1.077	19.1	Early
6097	76	70	1.075	18.6	Early
6080	76	116	1.065	16.5	Medium early
4814	42	21	1.069	17.4	Very early
6156	28	86	1.079	19.4	Very early
6279**	--	--	1.061	15.6	--

* Number of replications included.

** Planted 1 month later than others--no yield data.

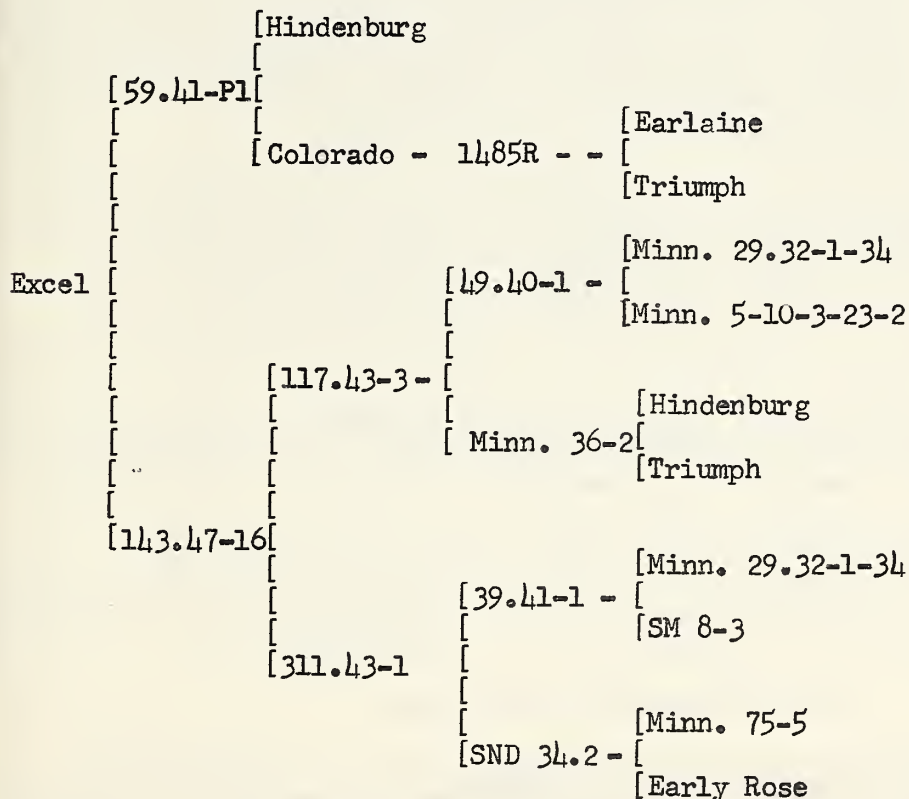
NEBRASKA

H.O. Werner and R. B. O'Keefe

Introduction of New Varieties

The introduction of new varieties includes data on yields and other results of field trials.

Releases to certified seed growers in 1957: Excel (formerly 82.49-1x) midseason to late; stems medium erect, relatively stiff; plants medium compactness; leaves dark green; scanty, pale red flowers with poorly developed anthers and no pollen. Tubers - medium to light pinkish red (Maerz and Paul number range 2A6 to 2H6): oblong flat (modal (L/W 1.10 - 1.20 and T/W .75 - .81; medium to large, seldom very large; skin relatively smooth usually bright; eyes medium depth or less; interior color unusually white; high specific gravity (1.078 to 1.089, usually .014 to .016 higher than Red Pontiac; when cooked high mealiness, excellent white color retained on standing; fair for chips but reconstitutes poorly. No known disease resistance, however, losses due to scab have usually been less prevalent than with the more susceptible varieties and percentage of plants as yet infected with virus X has been found to be relatively low. Yields are not the very highest but above the median for most varieties and commercial appeal to high because of bright red color, intermediate size and relatively smooth tuber type. The breeding derivation is as follows:



Haig (formerly 223.48-1x) probably the most scab resistant variety now available that is suitable for growing on scab infested soils in western Nebraska. Midseason to early, plants medium to small; leaves medium to small, open, dark green, glossy. Flowers abundant, pollen good. Tubers broadly oblong, slightly elliptical, medium thickness (modal L/W 1.000 to 1.115, T/W .75 to .83); much uniformity in shape; intermediate to large; skin creamy white with scaly russet when mature; lateral eyes shallow, apical eyes deep; interior color medium white; specific gravity intermediate to high; culinary quality - high mealiness, fair to good color; fair for chips but re-constitutes poorly. Scab resistance on a par with Cayuga, seems highly resistant under field conditions to virus X. Medium to high yields in western Nebraska, fair to medium in central Nebraska. Recommended especially for growing on western Nebraska soils where scab is troublesome. The breeding derivation is as follows:

			[Minn. 66-5 (Katahdin - selfed)
		[Minn. 15-2	[Minn. 4-9-1
[Minnesota 43		[Minn. 11-1-25	
[		[Minn. 41-1	
[	[Jubel		
Haig			
(223.48-1x)			
[Cayuga			

Advance selections that may be released in 1958: 156.48-2X, excellent yields of intermediate to large, intermediate red oblong tubers with high specific gravity and good culinary quality. 315.48-3X, very long, light pinkish red, large, relatively uniformly oblong very slightly elliptical tubers with very high specific gravity, very good for baking. However, very susceptible to scab. Relatively versatile adaptability. For further information about these varieties and selections see section VIII of this report.

Improved seed germination: (By R. B. O'Keefe) In a series of preliminary trials it was found that light is essential for prompt high germination of potato seed. Excellent results are obtained by sowing seed on moist soil, in high humidity in fluorescent light (immaterial whether white or red). This is very effective with either seed only recently harvested or seed several years old.

Acceleration of growth of seedlings being raised in gravel culture: (By R. B. O'Keefe) Heretofore, there has been a definite period of slow vegetative growth shortly after seedlings were transplanted into gravel beds. Results with gibberellic acid have been: (1) growth rate of plants from gibberellic-treated seed has been accelerated 50% beyond that of check plants. (2) Foliar applications doubled the weekly growth rate and height, and increased size of leaflets by 50%. (3) Combinations of seed and foliar applications were superior to only seed treatment but not equal to foliar applications only.

Screening Seedling Populations

Screening populations of 1957 (Spring) crosses: (By R. B. O'Keefe) Many segregates of crosses between late blight resistant and red tuber selections survived a severe late blight epidemic induced in high humidity in a controlled temperature chamber see table 1.

Nebraska table 1. Late blight resistance in progenies of late blight resistant crossed with scab resistant parents.^{1/}

Scab Resistant	Late Blight Resistant Parents					
	ND 3131N2	Wisc. 143-52	Wisc. 137-52	B595-76	Iowa 801-10	La. 91-143
Red tubers						
143.49-1	5:25	8:45	-----	6:31	-----	-----
156.52-2	5:16	17:50	17:55	-----	-----	-----
164.51-2	10:30	10:20	10:10	-----	20:15	-----
114.51-2	-----	-----	-----	3: 0	10:10	-----
133.53-1	-----	-----	-----	10:40	-----	18:37
White tubers						
Haig	7:11	-----	-----	30:10	12:32	-----
Louis.91-143	-----	-----	-----	-----	-----	15:15
18.53-2	-----	-----	-----	-----	-----	6:15
84.51-1	-----	-----	-----	-----	8:22	-----

^{1/} Actual numbers of Resistant to Susceptible segregates.
Resistant = 0 infection to very few minute arrested lesions. Race or races of pathogen unknown; inoculum obtained directly from infected plants (2nd generation of spores). Deviations from a 1:1 ratio are probably due to numerous small, weak seedling plants and critical classification.

Heat or drouth endurance: The method of testing seedling plants for heat resistance that is now being used with the heat machine is 116° F., 60% R. H. for 6 hours with estimation of survival condition made 24 hours after the test. All plants are placed under standard type of illumination for 15 hours before being tested. After trial of several temperatures, relative humidities and durations, this type of test was considered to more truly depict best endurance differences with potato plants grown directly from seed than the higher temperature (131-133° F.) and shorter (1½ hours) heretofore used. Heat resistance was found to be heritable. Mean resistance within families was greater than that of the susceptible parents. Some typical results are in Neb. table 2.

Testing, screening, selection, etc. (H.O. Werner and R. B. O'Keefe) Much of this work is of a routine nature accumulating another year of experience with standard tests. The results of probable major interest of this year are:
Scab resistance - Clones continuing to appear among the best for scab resistance are:

<u>Red Tuber Lines</u>		<u>White or Russet</u>	
114.51-1	86.49-1x	28.51-4	223.48-1x(Haig)
156.52-2	143.49-1	45.51-3	77.51-2
45.51-4	59.41-P1	25-47-7x	45.47-5x

Nebraska table 2. Frequency distribution of progenies tested for heat resistance.

Parents	Parent Resistance	Cross	Resistance Class ^{1/}				Total No.	Mean Results	Ratio 1:2:3+4
			1	2	3	4			
R-1 114.49-1x	1	R ₁ self.	4	6	11	11	32	3.12	1:2
R-2 90.49-1x	2	R ₂ self.	0	2	4	3	9	3.44	1:3
S-1 143.49-1	4	S ₁ self.	8	0	9	11	28	2.87	1:25
		R ₁ x S ₁	11	6	8	6	31	2.33	1.2:1
		R ₂ x S ₁	9	10	6	7	32	2.53	1.5:1
		R ₁ x R ₂	7	9	8	8	32	2.67	1:1
Results with inbred parents - 2nd generation selfing									
R ₃ 104.52-2	1	R ₃ Self.	11	8	10	3	32	2.16	1.3:1
R ₄ 77.51-2	2	R ₄ Self.	1	1	2	2	6	2.97	1:2
S ₂ 140.47-1	4	S ₂ Self.	4	7	9	12	32	3.14	1:2
		R ₃ x S ₂	10	7	9	6	32	2.57	1.1:1
		R ₃ x R ₄	11	10	10	1	32	2.08	2:1

^{1/} Refers to apparent damage 7 days after testing:

- 1 = slight leaf damage - resistant.
- 2 = moderate leaf damage - resistant.
- 3 = severe leaf plus stem damage - susceptible.
- 4 = severe leaf and stem damage - susceptible.

Psyllid resistance: Plants of clones growing in one trial - where inadvertently psyllids were not controlled - exhibited a great range of psyllid survival ability as measured both by lack of plant symptoms and by tuber crop. Because of the preliminary and empirical nature of these results it is inadvisable to designate them at this time but it is hoped that the clones seemingly resistant may be tested more orthodoxly in 1958.

Freedom of tubers from morphological defects: In progenies of recent years where greatest emphasis has been placed on acquiring scab resistance, some ground has been lost as noted by greater frequency of clones whose tubers have hollow heart or that are subject to harvest-time cracking. These are counterbalanced by a group of excellent type red skin tuber segregates acquired in 1955 and 1956 crosses, however, these are mostly scab susceptible.

Bright red skin color: With the acquirement of more scab resistance in the red tuber clones there seems to have been an increase in skin russetting or browning- which is commercially undesirable. This has been especially true of lines from Hindenburg and Cayuga. Special efforts are being made to discover the clones that consistently produce bright red tubers regardless of soil, or maturity etc. Some of the most promising of these clones appear to be: 20.44-2, 181.51-2, 95.52-2, 111.52-1, 9.53-5, 184.53-1, and 191.55-1. These are being selfed and combined.

Interior tuber color: Interior raw color is considered indicative of interior cooked color. In all clonal and adaptation trials, tubers are classified as to their interior color. The most consistently superior lines for white interior color appear to be:

	<u>Red skin color</u>	<u>White skin</u>
82.49-1 x(Excel)	143.50-2	231.47-2x
83.49-1	181.51-2	28.51-4
86.49-1x	222.51-9	45.51-3
154.49-3	95.52-4	77.51-2
17.50-2	111.52-1	39.53-12

Numerous lines of 1955 crosses look promising but have not been tested adequately for categorizing.

Chip making quality: Redbake tubers have consistently been found very good for chip making. They have reconstituted very well after cold storage. It is therefore probably the first red variety dependable for this use. Tubers of most advanced seedling clones have been found satisfactory for chips if not chilled, but after chilling very few reconstituted well. The most promising with fair to good reconstitution appear to be: 95.48-1 (Dark red), 77.51-2 (White), and 181.51-2 (Red).

Retention of white color in raw sliced potatoes is very important in commercial peeling and processing. Tubers of most varieties and classes discolor very rapidly. In standard tests for this character the following were found to be superior in retention of white color in raw slices.

<u>Very Good</u>	<u>Good</u>	<u>Good</u>
Cayuga	83.49-1	294.50-1
156.51-2	176.50-3	302.50-1
332.51-2	284.50-2	Progress

Suitability of Nebraska stocks for the southern states: Cooperative tests of numerous Nebraska red tuber lines were conducted in south Alabama by Frank Garrett in 1957. In replicated yield tests of 26 Nebraska lines harvested in mid May yields in comparison with Red LaSoda on a statistical analysis basis (Duncan's Multiple Comparison Test, see Federer, Experimental Design, pages 33-40) were:

<u>Significantly Greater</u>	<u>Within the same range</u>	<u>Only slightly lower</u>
222.51-9	Excel (82.49-1x)	90.49-1x (Red Pontiac)
315.48-3x	Redbake	131.50-2
	181.51-2	156.48-2x

Mean total of Red LaSoda was 187.3 cwt/A with a U.S. #1 grade, A-size yield of 163.7. In observational plantings of selections intermediate in the program - more than a dozen compared favorably with Red LaSoda. These trials and the current trend of variety use in the Gulf Coast area indicates that

vigorous growing vine types are required to produce the high yields now necessitated for economical production. Line 222.51-9, the highest yielding line in the trial, had been considered entirely too late for commercial use by Nebraska growers. (This phase of work has been supported in part by a grant from the Potato Development Division of the Nebraska State Department of Agriculture.)

Discovering and maintaining virus-X-free strains: (by Technical Assistant Richard Miyoshi) On the basis of serological tests in the greenhouse and in the field the following results have been attained: Small stocks of seed potatoes that are free of virus X (negative reactions) have been acquired: With the following Nebraska varieties: Dazoc, Sheridan, Haig, Excel, Redbake. Very few infected plants have been found in Haig but with Redbake infection is so general as to cause uncertainty of our final selection. With the following advance lines: 29.47-2 (white), 215.50-2 (red), 114.51-2 (red), 120.40-6 (white), 222.51-9 (red), 315.48-3x (red), 156.48-2x (red), and 156.52-2 (red). Among these, lines 120.40-6 seems highly resistant, only a very few infected plants having been detected in the 17th year this selection has been under field conditions. One immune red tuber line is 392.51-3 (59.41-P1 x U.X. - B766-2). Seed stocks free of virus X, of 6 varieties and 6 selections in quantities from a few tubers up to several hundred pounds were supplied to the Foundation seed program for isolation increase. Crosses of Nebraska lines have been made with the following immune parents: 392.51-3, ND - B 3131N2, Wisc. X 143-52, Wisc. X 137-52, B 595-16, Iowa 801-10. (Serum and counselling on techniques have been provided by Dr. Wm. Allington and Dr. Ellen Moorehead, Department of Plant Pathology).

Screening advance lines for heat and/or drouth resistance (basis of heat machine tests): Twenty-one advance clones were found equal or superior to Irish Cobbler which has consistently been found to be one of the most heat enduring varieties available. The better of these lines seem to be: 77.51-2 (S. chacoense derivative), 84.51-1 (S. chacoense derivative), 104.52-2, 181.51-2, 83.45-1, 90.48-1x, 45.51-3, 102.53-8, 114.48-1x, 133.53-1.

This winter seedling tubers are being produced with progenies from numerous crosses made in 1957 with nine resistant clones. A high degree of heat resistance has been found to be combined with high scab resistance in the following clones: 104.52-2, 77.51-2, 84.51-2, 45.51-3, 133.53-1, and 106.52-1.

Commercial type peeling tests: With supervised replicated abrasion peeling tests conducted in a large dormitory kitchen it was found that the deep apical eyes of the new introduction - Haig - caused an increased loss in trimming (compared with other commercial varieties) but that the total peeling loss and cost were less because of the relatively shallow lateral eyes and relatively satisfactory shape of tubers for abrasion peeling. The waste and cost of peeling increased as size of tubers decreased.

Study of factors influencing heat and drouth endurance and developing testing methods. Because of the complications of testing for heat or drouth endurance under field conditions - with great vicissitudes of climate, controlled testing techniques will add much precision to any screening program.

Culinary tests of advance selections: With steamed potatoes the organoleptic general ratings by pannels of judges, of a group of varieties and selections grown at several places in 1956 are given in table 3.

Nebraska table 3. Mean general ratings of culinary quality in four Organoleptic tests.^{1/}

General Area	Western Nebraska		West Central Nebraska
County	Scotts Bluff	Banner County	Lincoln
Altitude	4020 Ft.	5200 Ft.	2900 Ft.
Culture	Irrigation	Dryland	Irrigation
Year grown	1955	1956	1955
Time of test	April 1956	Dec. 1956	April 1956
No. of samples	4	6	4
No. of judges	4	5	4
Variety			
Progress	58.5	79.2	68.8
Dazoc	72.9	74.0	75.1
Sheridan	75.8	76.5	77.3
Redglo	64.1	----	69.3
Redbake	74.6	88.0	79.6
Excel	72.4	73.8	82.5
156.48-2x	----	79.0	----
315.48-3x	----	88.7	----
Triumph	----	66.22/	66.8
Red Pontiac	55.9	80.62/	61.9
Red LaSoda	67.8	73.1	77.8
Red Warba	69.7	----	78.7
Haig	62.3	85.5	67.2
L. S. D.	6.56 ^{3/}	3.03 ^{4/}	6.56 ^{3/}

- 1/ General rating= perfect score 100, as sum of texture - 50, color 20, flavor 30.
- 2/ Aberrant mean thought to be relatively too high because tubers were considerably larger than those of all other varieties. Within a variety it is common experience for largest tubers to have highest specific gravity.
- 3/ L.S.D. calculated for variety X place (combining Scotts Bluff and Banner 1956), significant at 1% level.
- 4/ Differences significant at 1% level.

From a series of tests it was concluded that a test of 120° F. 50-60% R. H. for 5 or 6 hours is a better measure of the heat induced drouth resistance of clones than the former tests of 133-135° for 4-4½ hours. Five or six replications (test runs) with one plant of each variety in each run is standard practice as is also the standardization of plant condition by exposing plants of all replicates to uniform illumination (600 foot candles) for a period of 15 hours before testing. Damage and growth responses are determined by estimating condition 24 hours after testing, and by dry weight determinations. It is also important to have test plants of nearly uniform height.

Statistically significant correlation found were the following: Between degree of wilting during the test and permanent damage to the main plant axis (positive); Between permanent damage and lateral growth after testing (positive); Between degree of permanent damage and tuber growth (negative); Between leaf and stem dry weight (positive); Permanent damage and stem dry weight (positive), - indicative of the effect of plant height. No correlation was found between estimated degree of wilt and leaf area or dry weight.^{1/}

Study to determine induced heat and drouth effects on potato varieties under field conditions. (O'Keefe) With clear plastic tent like heat traps over rows of six varieties of potatoes growing on dryland at Alliance, Nebraska, the average mean temperature was raised 4.7°F., but minimum R. H. was also raised 8.6%. Although the mean July 27 - August 23 maximum temperature was 102.7°F., the plastic covered plants grew larger, and had greater leaf area and tuber production than check plants. These results suggest that desiccating conditions, other than temperature, must be considered in studying effects of induced drouth on plants.

Rate and extraction of water by potatoes under field conditions, (Werner) When randomized square blocks of plants of six varieties (or clones) were grown on soil filled to field capacity at planting time but with a water proof cover over the entire area to prevent the acquisition of seasonal moisture from rainfall the general results were as follows: Varieties (or clones) differed slightly in rate and depth of water removal prior to August 24. After then, the amount of water removed at increasing depths corresponded closely with the extent of retention of healthy green leaves by the plants. Of the calculated total water used - the mean of percentage removed by various depths by all varieties was:

0 - 6 inches	27.8%	
6 - 12 inches	14.6%	44.4%
12 - 24 inches		23.4%
24 - 36 inches		18.3%
36 - 48 inches		14.6%
48 - 60 inches		1.2%

^{1/} For this and other studies on optical planimeter was constructed by redesigning the instrument described by:
(Miller, E. E., Shadbolt, C. A., and Holm, L. Use of an optical planimeter for measuring leaf area.
Pl. Phy. Vol. 31 No. 6 Nov. 1956)

With plants in adjacent areas, permitted to absorb the seasonal rainfall (4.06 effective), the total water usage with vigorous long season varieties was 9 inches, with weaker short season varieties it was about 7 inches. (The techniques of this procedure are so exacting and laborious that it does not seem suitable for use as a routine technique. Our results also indicate a likely very close association between size of plants and root development.)

Root extension ability of potato varieties (Werner): In order to force maximum elongation of roots, seed pieces of six varieties were planted at the ends of plastic tubes lining ditches (about 6 inches in diameter) and 10 ft. long. The soil moisture in these tubes was up to field carrying capacity. The general results were: (1) the maximum root extension of all varieties was at least 240 cm. with some 300 cm., (2) the mean percentages of total weights of oven dried roots in 10 successive decimeter sections of these tubes was: 53.1, 18.9, 12.8, 6.6, 4.5, 2.2, 1.4, 0.5, 0.6, 0.2%, (3) percentages of roots at greatest distances from the plants were greatest with most vigorously vegetative plants, (4) potato plants require considerable readily available water close to the plants until they are well established. Unless soil moisture was replenished (one to three times) in the first and second decimeter sections the plants died early or barely survived. After plants were well established (one ft. tall) they survived and grew well when the soil in the first 4 decimeters was very dry. (This method might be perfected further as a means of determining possible varietal differences in intensity and extent of root development.) Better results will probably be attained if trial plants are surrounded by normal field plant population rather than being widely separated.

Differential tuberization ability at high soil temperatures: Plants of 16 varieties growing with a ground cover of black plastic around for a distance of 1 ft. on each side of the plants produced 18% less dry weight of tubers than plants growing with ordinary culture. The yield depression appeared least with early weakly vegetative selections. With the Excel variety tuber production under white, light gray or aluminum plastic covers (2 ft. square per isolated plant) was increased, and that under black plastic was decreased in comparison with check plants where no ground cover was used.

Parental line breeding: The major objectives of this project are to develop homozygous red tuber parental lines with resistance to scab (*Streptomyces scabies*) and/or heat and drouth.

Development of homozygous scab resistant lines: Current scab resistant lines of major interest, their derivation and utilization in 1957 crosses are given in Neb. tables 4 and 5.

Development of homozygous heat resistant lines: The development of homozygous heat and/or drouth resistant lines involves a new aspect in potato breeding. Consequently, the problem was approached in three phases: (1) development of a dependable greenhouse method of testing for resistance; (2) the determination of resistant parents, and (3) ascertaining the genetic inheritance of possible resistances. Tests were conducted in a heat machine utilizing various temperatures and relative humidities and a constant velocity of air movement. A test period of 6 hours with a temperature of 120° F. and R. H. of 50-60% was found to give a wide range of plant response among varieties. Resistant

parental stocks were selected by replicated tests under the above conditions. Test crosses, for inheritance studies, were made utilizing selected resistant and susceptible parents. For details see Nebraska table 2., Section IV, A. 2.

Nebraska table 4. Inbred scab-resistant lines (selfs and crosses between resistant lines with common parent).

Source of Resistance and Common Parent			
Cross 1957	Line	Cross 1957	Line
<u>59.41-P₁</u>		<u>Jubel</u>	
2	143.49-1 selfed	34	104.52-2 selfed
37	156.52-2 "		104.52-2x "
1	86.49-1x by 143.49-1		
4	156.52-2 by "	<u>Minn. 43</u>	
12-172	392.51-3 by "	72	Haig selfed ^{1/}
21	86.49-1x by 154.49-3	73	90.49-1x by Haig
22	143.49-1 by "		
23-36	152.52-2 by "	<u>Menominee</u>	
<u>Cayuga</u>		76	378.49-2x selfed
24	25.47-7x ^{1/}	204.56	114.51-2 "
	154.49-3		
25	Haig by 154.49-3 ^{1/}		
72	Haig selfed ^{1/}		
194.56	25.47-7x selfed ^{1/}		

^{1/} White tuber line.

Nebraska table 5. First and second generation inbreds from parents of diverse types of resistance.

1957 Cross	Line	1957 Cross	Line	Ontario derivative
94	77.51-2 selfed	99	84.51-1 selfed ^{2/}	202.56 ^{1/ 2/} 29.47-2 selfed
57	164.51-2 "	192	133.53-1 selfed	(Ontario by 101.40-3)
86	45.3 selfed ^{2/}	184	18.53-2 selfed ^{2/}	

^{1/} Crosses made in 1956.

^{2/} White tuber line.

Variety and advance selection replicated adaptation yield trials; trials of Nebraska varieties or selections. Replicated yield trials of eight Nebraska varieties, eight advance selections and two or four standard varieties were again conducted at three irrigated and three dryland locations in western Nebraska (June planting), two irrigated locations in central Nebraska (April planting) and two non-irrigated locations in eastern Nebraska (April planting).

In each trial all varieties were planted in four randomized single-row plots 36"x 12" with irrigation and 42"x 16" on dryland. In order to give a composite picture of the status of the several selections the data summarized as two year (1956-1957) means of all means for major aspects of each variety or selection are presented in Tables 5 and 6.

Western irrigation. An advance selection - 156.48-2x (see section I B) - was far superior to all other varieties or selections in production of U. S. No. 1 grade. Satisfactory but distinctly lower mean yields of red tubers were produced by Red LaSoda, Progress, Red Pontiac, selection 315.48-3x (see section I B) and the new variety Excel (formerly 82.49-1x). In a lower yielding group were Redglo, Dazoc, Sheridan and Redbake. The new white russet scab resistant variety - Haig - was one of the better of the second most productive group. No. 315.48-3x, Excel and Redbake warrant careful consideration because of high specific gravity, high grade and other special qualities.

Possible gross income per acre to growers have been calculated for all varieties on the basis of conservative Modal prices for certified seed or table stock potatoes. The values as reported in column 15 of tables 5 and 6 are in similar but not identical order of the U. S. No. 1 yields. Potatoes of varieties with tuber type ratings of 8 or higher will command a premium price whereas those with ratings below 7.5 are often sold below the general level.

Western dryland. Yields were near those of long time averages. Selection 156.48-2x was again of the highest rank. The new varieties, Excel and Haig, appear to be commercially desirable in yield and quality.

Central Nebraska irrigation trials. The red lines 95.48-1, 156.48-2x, 315.48-3x and varieties Excel and Redbake all merit consideration because of excellent to very good tuber type, high specific gravity with high to satisfactory yields. Redbake is distinctive as a red skin variety of excellent tuber type, good baking quality and good chip quality including good reconstitution. Excel is distinctive because of very white interior color and good culinary quality. It may prove suitable after harvesting late in the summer.

Observational trials. Yields of three varieties Redkote, Red Beauty and Redburt planted in single row blocks - were lower than with the better red varieties or lines in the yield tests. Of these varieties Redburt was most productive, Redkote least. The specific gravity value of Red Beauty was among the highest. All three had considerable scab.

Central states yield trial was conducted on an irrigated farm near Alliance. Results are reported with the North Central Regional section.

Tuber shape of various varieties or selections. During the past three years the length, width and thickness was obtained with forty tubers of a number of varieties or selections in a number of the western Nebraska trials. The means of ratios derived from these are as follows:

Variety or Selection	Total per acre Cwt.	U. S. No. 1 A-size		Specific gravity	U. S. No. 1 A-size			Stand	Season	Color	Tuber type	Defects		Gross income combination seed and table price
		Per- cent	Per acre		to 1 7/8" 2 5/8"	to 2 5/8" 3 1/4"	Over 3 1/4"					Scab	Other	
Western Nebraska - Irrigation Trials (Three Locations)														
Progress	308	82.4	254	75.7	69.4	27.7	2.9	96.7	4.8	5.6	7.7	1.6	4.3	\$481.57
Dazoe	261	81.4	217	74.6	50.3	37.5	12.2	94.7	2.6	8.2	7.0	5.8	3.5	403.93
Sheridan	246	81.1	199	77.6	60.2	32.5	7.3	95.0	4.7	6.6	7.3	5.0	3.1	379.62
Redglo	287	77.2	219	76.8	50.7	39.1	10.2	98.0	7.1	8.7	7.2	8.7	3.2	425.44
Redbake	245	80.8	200	82.9	45.6	47.0	7.4	94.8	5.1	6.6	8.3	8.4	2.2	375.78
Excel	278	81.0	232	81.1	47.7	43.9	8.4	92.8	6.6	5.3	8.7	4.6	6.0	429.89
156.48-2 x	390	81.3	321	80.7	35.4	40.0	24.6	99.3	5.6	4.6	8.5	6.1	2.3	583.72
315.48-3 x	314	73.4	234	81.9	46.1	46.0	7.9	97.6	5.9	5.0	8.9	8.6	2.4	465.61
R. Pontiac	312	77.8	241	69.5	31.9	48.4	19.7	96.1	7.0	6.2	7.4	2.7	14.2	461.25
R. LaSoda	317	81.3	259	74.4	24.4	43.3	32.3	97.6	6.6	7.7	7.1	2.0	10.0	474.62
Haig	300	85.4	257	80.4	40.2	44.3	15.5	97.2	4.6	6.4	8.1	.9	7.2	453.44
Western Nebraska - Dryland Trials (Three Locations)														
Progress	62.7	53.7	34.1	84.3	99.7	.3	0	98.3	3.2	5.6	7.5	2.6	1.6	\$93.12
Dazoe	61.0	61.2	37.8	85.6	88.4	11.1	.5	95.4	1.7	7.8	7.3	10.0	3.1	87.71
Sheridan	62.9	57.1	37.9	89.1	86.1	13.9	0	95.3	3.2	6.6	7.5	6.8	.7	96.29
Redglo	65.1	56.5	39.2	79.3	83.0	16.2	.8	91.1	5.3	8.6	7.1	5.3	1.9	105.09
Redbake	64.6	62.3	42.3	92.0	83.5	15.6	.9	97.6	3.7	5.1	8.6	2.7	2.9	103.72
Excel	69.6	65.1	45.9	96.6	90.9	9.1	0	93.6	4.3	5.5	8.3	4.5	1.4	106.43
156.48-2 x	96.4	72.0	69.8	89.4	74.1	25.4	.5	97.8	4.7	4.9	8.1	5.8	3.0	151.31
315.48.3 x	73.5	66.7	50.2	91.9	76.3	23.7	0	94.3	3.8	4.0	8.8	8.0	4.9	117.29
R. Pontiac	75.3	71.3	53.5	77.8	67.5	30.4	2.1	97.2	5.5	5.2	7.3	7.8	4.9	113.10
R. LaSoda	76.0	78.1	60.4	86.5	65.3	31.3	3.5	94.5	4.5	6.8	7.6	3.9	3.7	133.70
Haig	68.5	68.3	48.2	88.6	85.2	13.6	1.1	93.4	3.0	-	8.0	.2	3.3	115.60

1/ Specific gravity coded - XL,000

2/ Season - estimated at harvesttime: 1, dead - 9, green, blooming.

3/ Color of tubers estimated when harvested: 1, barely red - 5, intermediate - 9, extremely dark red.

4/ Income calculated on basis of the following prices - to grower for various grades and for sub-sizes of U. S. No. 1 grade.

On certified seed market: U. S. No. 1, 1 7/8 - 2 5/8" at \$1.75 cwt; below 1 7/8 at \$1.00 cwt; marketable defective tubers of A-size, at \$.95 cwt.

On table stock market: U. S. No. 1, 2 5/8 - 1 1/2" at \$1.60 cwt. and over 1 1/2" at \$1.00 cwt.

Nebraska table 6. Means of annual means of 2 years of potato trials in central Nebraska with Irrigation.

Variety or Selection	Total per acre	U. S. No. 1 A-size		U. S. No. 1 A-size		Stand	Season	Color	Tuber type	Defects		Gross income on basis of table stock prices		
		Per- cent	Per acre	1/2 to 5/8"	5/8" to 1 1/4"					Over 1 1/4"	Other			
													Pct.	Pct.
Central Nebraska (Irrigation), (April planting - August harvest)														
Dazoc	294	83.6	248	71.6	77.9	22.1	0	96.7	1.7	7.2	7.0	0.7	3.8	\$398.77
Redbake	284	82.9	239	75.4	73.5	25.8	0	95.4	4.8	4.7	8.5	0.8	1.3	379.96
Excel	289	81.2	242	80.6	86.1	13.9	0	93.6	5.3	5.5	8.5	2.8	1.9	393.37
95.48-1	317	87.2	282	71.4	67.0	30.3	2.6	94.2	3.0	8.5	9.0	3.5	1.9	448.48
156.48-2 x	366	83.4	315	73.6	79.2	19.6	1.2	96.5	5.0	6.2	9.0	1.3	2.1	499.97
315.48-3 x	321	81.8	267	72.1	76.5	19.9	3.6	95.5	3.7	4.0	9.0	5.7	5.0	434.81
Red Warba	298	75.4	218	68.5	66.7	31.4	1.9	93.9	2.2	7.0	5.5	2.3	14.4	391.38
R. Pontiac	334	81.1	277	59.9	71.6	24.3	4.1	97.4	5.5	5.0	6.5	2.4	10.3	484.65
R. Lasoda	323	81.0	268	63.4	62.7	33.6	3.7	93.5	5.5	6.2	7.0	0.7	11.3	448.00
White Cloud	301	87.5	266	70.8	67.2	31.0	1.8	93.3	3.2	-	8.0	2.8	2.4	426.81
Haig	260	88.9	231	70.2	68.3	28.7	3.0	97.9	3.0	-	8.5	0	8.8	369.61

1/ Specific gravity coded XL,000

2/ Season estimated at harvesttime: 1, dead - 9, green and blooming.

3/ Color of tubers, estimated at harvesttime: 1, very pale - 9, very dark red

4/ Tuber type, estimated 6.5 minimum commercial acceptability, 9, excellent.

5/ Income calculated on table stock basis with following prices on graded tubers:

U. S. No. 1 grade sized into subsizes:

U. S. No. 1, 1 7/8 - 2 5/8 at \$1.50 cwt.; 2 5/8 - 3 1/4" at \$1.60 cwt.; over 1/4" at \$1.00 cwt.; A-size grade defective at \$.85 cwt. and small small at \$.25 cwt.

Nebraska table 7. Means of tuber measurements during three years, 1955-1957.

Variety or Selection	Irrigation			Dryland		
	Number trials	L/W	T/W	Number trials	L/W	T/W
Progress	7	1.110	.805	7	1.072	.833
Dazoc	3	1.051	.832	3	1.080	.862
Sheridan	4	.905	.805	4	.843	.851
Redbake	10	1.066	.757	9	1.059	.798
Excel	9	1.107	.793	8	1.143	.832
156.48-2x	3	1.077	.802	3	1.047	.835
315.48-3x	6	1.549	.824	4	1.407	.862
215.50-2	9	1.272	.822	8	1.305	.846
93.48-1	4	1.311	.747	4	1.269	.805
95.48-1	3	1.064	.788	1	1.206	.797
Haig	10	1.044	.818	9	1.023	.836

There was a trend for tubers to be relatively longer with irrigation than on dryland, the mean W/L ratios of the 11 varieties having been greatest with irrigation. The irrigated potatoes were relatively flatter - the T/W means having been greatest with all of the dryland potatoes.

NEW HAMPSHIRE
Paul T. Blood

Twenty-four seedlings and varieties were grown in a yield test at Northwood, N.H., on Paxton soil, with approximately 1600 pounds of an 8-12-12 fertilizer applied per acre. Each plot consisted of 2 rows, 20 feet long, planted within a randomized block and replicated 4 times. Seed spacing was 10 inches for all varieties. The test was planted May 17 and harvested October 9. This was the driest summer on record.

The samples for the chipping test were normally above 40°F. before conditioning, which is the usual practice. Therefore, half of the varieties rated as excellent. From December 4 to 18 the samples were held at 80-90°F. for conditioning. Frying temperature was 395°F. Cotton seed oil was used as a frying medium. The test will be repeated late after holding samples at 40°F. before conditioning.

Regardless of it being the driest growing-season on record in this area good yields of tubers with excellent dry-matter content and chipping qualities were produced by Kennebec, #10, Russet, and Katahdin.

N. H. table 1. Yield, total solids and chipping quality of 24 potato varieties grown in New Hampshire, 1957.

Variety	Yield per acre		Total solids	Chip color rating 2/	
	Over 2 ^m	Under 2 ^m			
	Bu. 1/	Cwt.	Bu.	Pct.	
Teton	481	289	23	21.7	P
Kennebec	466	280	36	21.3	E
Green Mount-					
ain	462	277	45	23.2	F
#10	449	269	19	22.0	E
Saco	445	267	32	24.4	P
Russet	432	259	45	22.2	E
46125	426	256	37	22.5	E
Delus	413	248	9	23.7	G
Katahdin	383	230	32	22.1	E
B605-10	380	228	50	22.1	F
43-47-10-50	380	228	56	22.3	G
Plymouth	377	226	16	23.1	E
Early Gem	364	218	16	19.2	F
Cherokee	361	217	48	24.0	E
Canoga	358	215	47	22.9	G
Merrimack	349	209	23	24.3	E
Rushmore	344	206	16	22.0	E
F451	327	196	47	23.4	E
Manota	326	196	48	22.0	F
114.2-3-44	324	194	94	22.7	G
Cobbler	309	185	69	23.2	E
B932-9	293	176	93	24.9	E
Canso	276	166	32	24.4	G
47-44-R-47	250	150	64	23.4	G

1/ L.S.D. 80

2/ Chip ratings: E, excellent; G, good; F, fair; P, poor.

NEW JERSEY
John C. Campbell

Potato variety trials were conducted at 3 locations by the New Jersey Agricultural Experiment Station in 1957. Two were located in central New Jersey and one in south Jersey.

Test with Seabrook Farms Company, Seabrook Research Plots, Seabrook, N. J.:
The final results of this test are not completed. The test was conducted to obtain information on the effect of planting and harvesting dates of potato varieties on the quality of frozen French fries. A total of 23 varieties were planted: 17 varieties with 3 planting dates, May 1, June 15 and July 15 on 2 dates; and 1 on only one date of planting.

Harvest of the first planting was started when the potatoes reached maturity (85 - 95% of the vines dead) and was followed by the second and third harvests which occurred approximately 20 and 40 days later. Harvest of the second planting was approximately 30 days after maturity. Early varieties from the third planting were harvested October 15 and on October 29, following a killing frost, all the varieties were harvested.

The season was very dry but the potato tests were irrigated. Approximately $5\frac{1}{2}$ inches of water was applied on the first planting, $4\frac{1}{2}$ inches on the second, and $3\frac{1}{2}$ inches on the third.

Highest average yields were produced by Kennebec (497 bushels per acre) followed closely by Green Mountain (487 bushels per acre), Chippewa (457 bushels per acre), Saco (441 bushels per acre) and Pungo (423 bushels per acre total yield). All of these varieties produced from 80 to 90 percent of U.S. 1 tubers.

Relatively high total solids (17.9 - 18.6%) were produced by Green Mountain, Merrimack, Delus and Pungo and low total solids (under 17%) were produced by Redkote, Russet Sebago, Antigo, Boone, Canso, Onaway, Tawa, Katahdin, and Chippewa.

Data on French fry color and texture have not been received, therefore, the evaluation of these varieties is incomplete.

Middlesex County Test, Simonson Brothers Farm. Thirty varieties were evaluated and the results are shown in New Jersey table 1. Although the season was very dry the potatoes were irrigated 6 times. Top yields were produced by Pungo, Onaway, Kennebec and seedling B69-16. However, B926-9, Merrimack and Saco also produced yields similar to those of Katahdin. Relatively poor yields of U.S. No. 1 tubers were produced by Russet Burbank, Cherokee, B595-76, White Cloud and Russet Sebago. Although Burbank and Cherokee produced good total yields, they both produced a large percentage of knobby tubers.

Over 20 percent dry matter was found in the Merrimack, Delus, Green Mountain, B73-3 and Russet Burbank.

New Jersey table 1, Potato variety test, 1957, Simonson Brothers' Farm,
Cranbury, N. J.

Variety	Seed source	Yield per acre		U.S. No.1 Pct.	Maturity ^{2/}	Total solids Pct.	Chip color ^{3/}	Remarks
		Total Bu.	U.S. No.1 Bu.					
Pungo	Maine	548	510	93	L	19.6	8	15% knobby, skin rough, slight sprouting
Onaway	Mich.	539	480	89	M	17.6	8	4% knobby, 6% B's
Kennebec	Maine	568	449	79	L	18.4	7	8% knobby, 8% B's
B 69-164	N. J.	508	447	88	L	19.1	7	1% knobby, 6% Fusarium rot
B 926-9	Maine	467	434	93	E	16.7	5	Large tubers, skin rough, 5% knobby
Katahdin	Maine	470	432	92	ML	17.2	5	2% Fusarium rot
Katahdin								
X-free	Mass..	463	431	93	ML	16.7	5	1% Fusarium rot, 1% knobby
Merrimack	Maine	477	415	87	L	20.4	4+	6% knobby
Saco	Maine	630	409	65	L	17.6	7	6% Fusarium rot, 22% knobby
Canso	Maine	425	404	95	ML	18.4	6	1% Fusarium rot
Delus	Maine	453	399	88	L	20.9	6	3% Fusarium rot, 6% growth cracks, knobby
Redkote	N. D.	442	371	84	L	16.7	6	9% B's, small to medium
Keswick	Maine	403	363	90	E	18.6	6	5% knobby
Tawa	Mich.	383	360	94	E	18.9	6	5% B's, tubers round, sl.rus.
G.Mountain								
	Maine	473	345	73	L	20.4	7	12% knobby, 11% B's
Chippewa	Maine	386	340	88	M	15.7	5	8% B's
Cobbler	Maine	398	330	83	E	19.1	5	6% knobby, 9% B's
Plymouth	Maine	345	321	93	ME	19.4	3	2% knobby
Manota	Maine	356	320	90	E	18.1	6	4% knobby and growth cracks
X96-56	Maine*	380	308	81	E	18.6	4	2% knobby, 10% Fusarium rot
Antigo	Wis.	317	298	94	E	17.6	4	Slightly russetted
Dazoc	Neb.	363	294	81	E	18.1	6	13% B's, 2% knobby
B 73-3	Maine*	375	285	76	M	20.4	5	6% B's, 14% knobby
Boone	Maine*	322	274	85	L	17.3	7	10% B's, 2% knobby, small-med.
Rushmore	Wis.	363	254	70	ME	16.4	6	6% growth cracks, 18% scab
Russet								
Sebago	Wis.	292	237	81	M	17.6	4+	2% knobby, 11% B's, 2% scab
White								
Cloud	Neb.	267	230	86	E	18.9	5	11% B's
B595-76	Maine*	298	209	70	E	17.4	3	10% knobby, 14% B's
Cherokee	Maine	408	180	44	E	18.4	4	36% knobby, growth cracks, 3% B's
Russet								
Burbank	Maine	506	157	31	L	22.1	7	8% B's, 53% knobby

1/ 2,200 pounds 5-10-10. Sidedressed Mag. 90-P14 - K290. Fine sandy loam with pH 4.7. Irrigated 6 times. Spacing, 10 inches by 36 inches. Planted April 15, 1957. Harvested September 11, 1957.

2/ See footnote 2, New Jersey table 2.

3/ See footnote 3, New Jersey table 2.

4/ Seed source New Jersey grown seed from 1956 variety test.

* U.S.D.A.

Lightest chip color was produced by the Plymouth, B595-76, and X96-56, Antigo, and Cherokee, although several other varieties produced chips of acceptable color (below 6) in the color scale.

Saco produced the highest total yield but 22 of the tubers were knobby. This is the greatest weakness of this variety. Onaway and Tawa were grown in New Jersey for the first time this year and both looked fairly good.

Monmouth County Test, Ketcham Brothers Farm. Twenty-four varieties were compared in this test. No replications were made. Yields were obtained from two areas within each plot and averaged. This farm received more rain than the Simonson farm and less irrigation was required. Yields were also much higher on this farm for Kennebec, Merrimack, and Katahdin producing over 600 bushels per acre (see New Jersey table 2). Saco also produced over 600 bushels but only 530 bushels made a U.S. No. 1 grade because of knobiness. Cherokee and Russet Burbank produced the lowest yields of U. S. No. 1's in this test also.

The percentage of dry matter produced in most of the varieties on this farm was less however, than those recorded for the Simonson Farm. Nevertheless Green Mountain, Delus and Merrimack had over 18 percent ratings for total solids.

Light colored chips were made from Saco, Dazoc, Antigo, Russet Sebago and Rushmore.

Scab developed in the Tawa, Rushmore, Dazoc and Russet Sebago varieties. It is interesting to note that the scab-resistant Russet Sebago was susceptible to scab on this farm.

New Jersey table 2. Potato variety test, 1957, Ketchum Brothers, Freehold New Jersey.

Variety	Yield per acre			Maturity ^{2/}	Total solids	Chip Color ^{3/}	Remarks
	Total Bu.	U.S. No. 1 Bu.	U.S. No. 1 Pct.				
Kennebec	694	652	94	L	16.2	5	no off grades.
Merrimack	630	617	98	L	18.6	5	no off grades.
Katahdin	602	596	99	L	16.9	5	no off grades.
Katahdin (X-Free)	610	592	97	L	16.9	5	no off grades.
Keswick	567	544	96	M	16.7	6+	very large tubers, deep eyes, .5% knobby.
Saco	663	530	80	L	17.4	4	18% knobby.
Plymouth	543	521	96	L	17.4	5	no off grades.
Pungo	572	503	88	L	17.9	7	3% knobby, 7% B's.
Onaway	504	484	96	M	16.7	8+	no off grades.
Chippewa	493	468	95	M	14.8	5+	no off grades.
Ganso	471	452	96	M	15.9	5	no off grades
Dazoc	485	446	92	E	16.7	4	1% scabby.
Antigo	438	429	98	E	15.7	4	round tubers, slightly russeted.

continued

New Jersey table 2, continued.

Variety	Yield per acre			Maturity ^{2/}	Total solids	Chip color ^{3/}	Remarks
	Total Bu.	U.S. No.1 Bu.	U.S. No.1 Pct.				
Delus	439	408	93	L	18.9	5	4% knobby and growth cracks
Redkote	440	405	92	L	15.0	5+	No off grades.
Tawa	466	405	87	M	17.2	5	7% sl. sc, 3% gr. cracks
G. Mountain	505	389	77	L	19.6	7+	1% Fusarium rot, 17% knobby and gr. cracks
R. Sebago	425	374	88	ML	14.0	4	1% Fusarium rot, 3% scabby
Rushmore	372	335	90	L	16.7	4	Large, russeted, oblong tubers, 1% knobby, 5% scabby
Boone	346	325	94	L	14.8	7	No off grades
White Cloud	336	299	89	E	17.6	5	Round tubers, small to medium
I. Cobbler	326	297	91	E	17.6	5	1% knobby
Cherokee	408	269	66	M	15.9	5	.8% Fusarium rot, 24% knobby and gr. cracks
R. Burbank	476	209	44	L	16.7	6	44% knobby, 9% B's

^{1/} 2,400 pounds 5-10-10 applied at planting. 500 pounds 10-10-10 sidedressed, Mag. 90 P 26 - K 175. Irrigated 4 - 5 times. Soil pH 4.9. Planted April 16, 1957, harvested October 1, 1957.

^{2/} L = Late season
M = Mid-season
E = Early season

^{3/} Lower score - lighter color; 6 or less acceptable (final harvest score).

NEW YORK

L. C. Peterson and R. L. Plaisted

The work conducted in 1957 was a continuation of the potato-breeding program described in previous reports. Greatest effort is placed on breeding for resistance from the golden nematode, late blight, scab and black-spot.

Breeding and selection are done in Ithaca. All single-hill, 10-hill increase, 25-hill increase and replicated yield plots are located on the University farm. With scab, black-spot and golden nematode, seedlings are grown in 2-hill, 10-hill or as single hill plots on Long Island. All plots are inter-planted with the variety Katahdin used as either a susceptible check or as a measure of yield. To keep virus infections at a minimum, representative samples of advanced seedlings are grown in the N. Y. State Certification plots in Florida during the winter months. All advanced seedlings are tested for specific gravity, after-cooking darkening and chipping quality. Chipping tests are conducted immediately after harvesting and again after a 3-month storage period.

Most of the seedlings produced are segregating for resistance from one or more of the above mentioned diseases. Approximately, 18,000 new seedlings were grown in the greenhouses; 12,000 as single hills; 600 as 10-hill increase and 200 as a 25-hill increase plot. The growing season was favorable for the production of a good crop of potatoes. In most cases, specific gravities were higher than usual and the great majority produced chips of acceptable quality.

Blight and Scab. Late blight was found in New York and in certain areas, was destructive on plants not properly protected. Within our plots, blight was insignificant and was found only late in the season and on the variety Russet Rural. It was not found on any of the blight differentials. Attempts have been made to incorporate "minor gene" with "major gene" resistance. The absence of severe blight in our plots in Ithaca and Long Island has made it impossible to assess the value of minor genes. The majority of seedlings grown in our plots are of the R_1R_2 genotype.

Seedlings segregating for scab resistance were grown in an infested vermiculite-soil mixture. Infesting the vermiculite with the scab organism prior to adding potting soil results in an even distribution of the scab organism and, in a medium of good physical condition. Prolonged periods of high summer greenhouse temperatures has a depressing effect on the number of tuber lesions produced. Those seedlings which survive this greenhouse inoculation are increased and grown in a scab-conditioned nursery on Long Island. Several hundred seedlings including those produced in Ithaca and those obtained from R. V. Akeley of the U.S. Dept. of Agriculture were grown in the scab nursery on Long Island in 1957.

Black-spot: Black-spot, a condition brought about by bruising, is a darkening of the tissues which is apparent when the potatoes are peeled. It does not appear to be caused by or to be associated with any of the common disease producing pathogens, including virus S.

Seedlings are grown and stored on Long Island. Bruising and rating for color intensity and internal necrosis are done in mid-winter by the Dept. of Vegetable

Crops. Symptom expression apparently is dependent on a number of different factors. The variable results obtained require testing over a period of years to obtain reliable results. Approximately 150 selected seedlings were grown and 50 were selected for further testing.

Golden Nematode. Seedlings are grown on Long Island in three cloth houses having a total capacity of 9,000 plants. The seedlings are grown in 4-inch pots and in soil in which the population of viable cysts is maintained at a high level. Resistant seedlings are selected by inspection of the "soil-balls." Resistant individuals are replaced in the pots and allowed to grow to maturity. Solanum andigenum and S. vernei are used as sources of resistance.

In crosses effected with S. andigenum, about 50 percent of the seedlings tested were resistant to the nematode. These results are in agreement with those published by European workers. Some of these seedlings have been crossed further and are being tested for yield and adaptation in central New York and on Long Island. In this group also are seedlings provided by R. V. Akeley of the U.S. Dept. of Agriculture.

Solanum vernei is a 24-chromosome species. Within our experience it is not self-fertile. Seeds were obtained when crosses were made between different clonal types. Seeds thus obtained, were treated with colchicin and polyploid obtained. Crosses have been made with this material. A few of the resistant seedlings have been backcrossed. In a few cases, notably with Russet Rural, Earleine, and Virgil, some seeds were obtained when crosses were made with the diploid vernei. A few of these have fertile pollen and in other cases, crosses have been effected with these seedlings when Katahdin or Merrimack was used as a male parent.

NEW YORK (Long Island)

R. L. Sawyer

There are several factors of main consideration in variety testing on Long Island. Varieties must yield as well as Katahdin or have some advantage for which the public is willing to pay a premium over Katahdin. A variety is needed which will give good internal quality without having the external defects associated with Russet Burbank and Green Mountain when they mature under hot August night temperatures. A variety is needed which will perform satisfactorily for the chipping industry when grown under Long Island conditions. An early variety is desired which is smoother than the Cobbler and has a well set skin early in the maturing season.

Since there is a wide range of planting dates on Long Island, varieties were planted on two dates, April 11 and May 15. Seed was spaced 10 inches apart in the row with $3\frac{1}{4}$ inches between rows. Plots were fertilized at the rate of 140 pounds of N, P_2O_5 and K_2O , and 50 pounds of MgO per acre. Plot size was a single row 50 feet long with four replications in a randomized block design. Samples will be followed through storage for chipping, black spot, peeled darkening, sprouting and shrinkage determinations. Results for the 1957 growing season are in New York table 1. Results for the 1956-57 storage season are in New York table 2.

Plymouth was much nicer appearing than the Cobbler and had a similar yield and specific gravity. Its flaky skin was attractive and this variety appeared promising as a replacement for Cobbler. Saco had a high total yield but the No. 1 was similar to Katahdin and it was much rougher appearing. Saco tended to have a lower internal quality than Katahdin. Delus looked very good from the standpoint of total solids and shape but yielded much lower than Katahdin. Kennebec in both the late and early planting yielded similar to, or more than Katahdin. The specific gravity of Kennebec tended to be higher but its overall external appearance was not as good as Katahdin. Huron out-yielded Katahdin at both planting dates in the 2- to $3\frac{1}{2}$ -inch size and had a higher specific gravity. Huron variety bears further investigation as a replacement for some of the Katahdin acreage. Russet Burbank and Green Mountain both have too rough an appearance to compare favorably with Katahdin despite their superior quality. Merrimack has a better total solids content than Katahdin but continues to give too great a yield reduction to make it a practical replacement. None of the varieties tested, except Plymouth and Delus, were as good as Katahdin in external appearance.

The black-spot index was high in all varieties for the 1956-57 storage season. Osseo had the lowest black-spot index but also had the lowest specific gravity. Russet Burbank, Early Gem and Cobbler had relatively low black-spot indexes. Saco, Merrimack, B 929-9, B 595-76 and Russet Burbank darkened relatively slow after peeling. Early Gem, Saco, and B 926-9 gave chipping indexes which were below or borderline to the index necessary for commercial acceptance. Cobbler, Plymouth, Delus, Katahdin and Russet Burbank all fell within the range which is considered most desirable for chip color. Shrinkage and sprouting was high with Saco and low with Russet Burbank and Early Gem. Merrimack, for the second year had one of the longest rest periods of the varieties tested.

New York table 1. Potato variety trial field results for 1957.

Variety	April Planting Yield (Cwt.)				May Planting Yield (Cwt.)				Remarks
	Total No. 1	2- $\frac{1}{2}$ inches	2/ Culls	Total solids	Total No. 1	2- $\frac{1}{2}$ inches	Culls	Total solids	
Cobbler	409	336	34	18.4	352	300	36	18.6	Nice shape, flaky skin Cobbler shape, knobs
Plymouth	395	280	14	17.9	299	234	21	19.2	
Onaway	386	307	27	16.7	400	304	56	17.1	
Cherokee	315	252	61	17.5	272	261	36	19.2	Nice shape, few sprouts
B 926-9	412	292	23	15.9	350	262	22	15.9	
Rushmore	345	298	25	18.1	277	237	69	18.1	
Saco	480	444	84	15.9	370	349	65	19.0	2nd growth, sprouts, rough Nice looking
Canso	357	258	17	17.9	310	258	21	19.7	
Katahdin	473	341	17	17.3	362	249	19	18.9	
Pontiac	501	387	62	15.0	458	331	21	16.2	Nice shape, flaky skin Knobby, misshaped
Delus	357	225	10	19.7	314	166	14	21.8	
Mohawk	336	244	28	18.4	339	275	31	20.2	
Kennebec	487	346	31	18.4	438	313	28	19.2	Large size Nice shape
Sebago	387	248	22	16.8	278	208	30	18.6	
59576	340	294	27	18.6	199	183	47	20.2	
Huron	486	417	37	19.7	427	374	58	20.2	Nice shape, yellow skin
Russet Burbank	391	364	84	19.7	219	192	161	20.1	
Green Mountain	466	348	64	21.3	431	368	49	21.9	
47156	389	251	25	18.4	320	216	16	20.0	
Merrimack	304	257	19	19.0	304	275	19	20.3	
L.S.D. at 5%	87	57	4	1.4	54	42	28	.6	

1/ Varieties are listed in order of maturation.

2/ Amount falling into the 2 to $\frac{3}{2}$ -inch size gives an indication of size variability for consumer pack.

New York table 2. Potato variety trial storage results for the 1956-57 season.

Variety	Solids	Shrink- age	Grams of sprouts per kilo- gram of tuber	Black spot index ^{1/}	Peeled darken- ing index ^{2/}	Chip- ing index ^{3/}
	Pct.	Pct.				
Cobbler	19.7	4.5	9.0	24.7	5.2	7.2
Osseo	16.2	4.8	15.6	13.6	5.2	5.7
Early Gem	17.7	4.2	3.0	22.2	4.5	4.2
Keswick	19.4	5.9	19.4	39.0	7.0	6.0
Plymouth	19.2	6.1	15.6	48.2	6.2	7.7
Delus	19.7	5.1	9.9	64.1	6.2	7.7
B 2368-4	17.3	5.5	12.4	49.0	6.2	6.0
Saco	19.9	7.2	19.7	43.4	2.7	4.7
Katahdin	19.0	5.6	12.1	43.6	4.5	7.0
Green Mountain	21.2	5.4	9.0	50.0	5.2	6.7
Merrimack	20.5	5.8	2.9	58.8	3.7	6.7
B 926-9	16.9	6.9	18.7	29.3	3.0	5.0
B 595-76	20.9	6.9	13.6	47.7	3.2	6.2
Russet Burbank	21.7	4.6	2.6	24.9	3.2	7.0

1/ Index scale = 0 - 90 taking into consideration percent showing blackening and intensity.

2/ Index scale = 1 - 9 with 1 indicating no discoloration. Color index made 1 hour after abrasive peeling.

3/ Index scale = 1 - 9 with 9 light and 5 the darkest possible for commercial acceptance.

NEW YORK
Ora Smith and P. A. Minges

Potato variety trials were conducted in only two counties of New York State, one at Ithaca (Tompkins County) and one in Wayne County in cooperation with the Associate County Agricultural Agent. Seed was obtained from the USDA station at Presque Isle, Maine, from the Nebraska Agricultural Experiment Station, and from local certified stock.

Eight varieties were grown on muck soil in Wayne County with 6-inch and 8-inch spacings of seedpieces. The plots were single rows each 28 feet long. There was only one replication in this test. Data of yield of marketable tubers, percent culls, appearance, percent dry matter, and color of chips made from unstored potatoes are presented in N. Y. table 1.

In the Ithaca test there were eleven varieties grown on mineral soil with 9-inch spacing. There were four replications of single row (34") plots each 25 feet long. Two thousand pounds 5-10-10 fertilizer was applied in bands at planting time.

Total yields and yields of U. S. No. 1 size potatoes (1 7/8" minimum) are shown in N. Y. table 2. Data on specific gravity and percent total solids of potatoes and color of potato chips made on day of harvest and after 10 days storage at 40°F. are presented in N. Y. table 3. Chip color was measured with the Hunter Color and Color Difference Meter.

N. Y. table 1. Potato Variety Trial - Wayne County 1957

Variety	Culls		Marketable tubers		Yield per acre	Variety appearance 2/	Total solids	Chip color		Remarks
	8 in.	6 in.	8 in.	6 in.				Pct.	Ave.	
	Pct.	Pct.	Cwt.	Cwt.	Cwt.					
Plymouth	16	12	192	270	231	1	18.5	17.1		Skin cracks
Saco	13	10	404	394	399	2	19.9	20.0		Irregular shape
B 2368-4	11	9	545	501	523	3	19.3	19.2		Good. Red smooth skin
Russet Burbank*1/	18	9	285	373	329	4	20.3	27.2		Fairly reg. shape
Delus	8	5	239	285	262	3	20.0	26.0		-----
Merrimack	13	7	166	259	213	3	20.2	31.6		Medium eyes
B 926-9	5	13	213	389	301	4	17.0	27.1		-----
Russet Rural	9	5	150	368	259	4	19.1	22.7		-----

*1/ 12 inch spacing on first replication of Russet Burbank

2/ 1 = poor to 5 = good

3/ Higher the number, the lighter the color. Above 17.0 is acceptable

Date planted: May 8, 1957

Plot size: 3 x 28 feet

N. Y. table 2. Total yields and yields of U. S. No. 1 potatoes, Ithaca, N. Y., 1957.

Variety	U. S. No. 1 size per acre		Total per acre
	Bu.	Cwt.	Bu.
Saco	818	491	842
Red Bake	592	355	618
Dazoc	563	338	615
Plymouth	559	335	570
Delus	513	308	523
B 926-9	513	308	528
Katahdin	504	302	528
B 2368-4	492	295	514
Russet Rural	433	260	448
Russet Burbank	423	254	474
Merrimack	390	234	415
L.S.D. 5%	168	101	174
L.S.D. 1%	226	136	234

Planted on May 31

Harvested on October 11

N. Y. table 3. Specific gravity and percent total solids of potatoes and color of potato chips made on day of harvest and after ten days storage at 40°F.

Variety	Specific Gravity	Total solids (percent)	Color of chips*	
			day harvested	after 10 days at 40°F.
Merrimack	1.093	22.6	30.4	14.8
Russet Burbank	1.086	21.2	34.2	17.2
Russet Rural	1.086	21.2	29.6	25.6
Delus	1.084	20.8	30.8	18.3
Saco	1.084	20.8	23.9	16.2
Plymouth	1.083	20.6	27.3	17.6
Katahdin	1.078	19.6	28.7	23.0
B 2368-4	1.074	18.7	27.9	16.1
Red Bake	1.074	18.7	27.1	16.4
Dazoc	1.070	17.8	26.9	15.9
B 926-9	1.069	17.6	27.6	15.7

* Hunter Color and Color Difference Meter readings. Chips of readings above 17.0 are considered satisfactory for color; those below 17.0 are considered too dark.

NORTH DAKOTA
Wm. G. Hoyman

Some unusual conditions prevailed in North Dakota during the 1957 growing season. The 6-spotted leafhopper, Macrosteles fascifrons, appeared earlier than usual; it was abundant during May and purple-top wilt was first observed the fore part of July. The aster yellows virus was responsible for the most purple-top wilt observed in the Red River Valley for the past several years. The most severe infection was observed in a field of Red Pontiac at Detroit Lakes, Minn. This field was surrounded by wooded areas and more weeds than commonly found in open fields in the Red River Valley. Ninety per cent of the plants showed symptoms. The aster yellows virus caused severe damage in some flax fields and several ornamentals were affected. It was an ideal year to determine what potato selections and varieties were resistant.

The hot weather during midseason reduced the setting of tubers on some varieties and caused some to heat sprout. Some second growth also occurred.

The abundant rainfall the latter part of August and more throughout September did considerable damage in the entire Valley. Late blight was probably the most abundant of any year in history. The foliage in an Irish Cobbler field at Kindred, N. Dak., was gone the latter part of August. Tuber late blight was severe in the scab plot at Fargo. It was common in the Valley and even observed on Kennebecs. Foliage infection of varieties and selections known to be resistant to race 0 indicated the presence of certain races.

Although russet scab continued to be the major disease problem it was no worse than in previous years and possibly somewhat less. Silver scurf was not as prevalent at Northwood, N. Dak., as during some previous years. The common viruses were no more common than usual.

Seed potatoes free of viruses

North Dakota does not maintain a farm for the increase of foundation seed potatoes for its growers. Increase of such seed is done by some certified growers. Some of the most common varieties and promising new selections are maintained free of all viruses. This stock is indexed in the greenhouse each winter and grown at an isolated location each summer. The varieties Red Pontiac, Early Gem, Kennebec, Norland and some promising new selections were increased in 1957 for distribution to growers in 1958.

Scab resistance

Twenty-six selections (Table 1) from the National Uniform Scab Trial and 16 additional selections were grown in the Fargo scab nursery. The selections are listed in order of their resistance. Due to the unusual occurrence of late blight in the plot, tuber readings were taken and appear in table 1.

A second scab nursery is planted at Northwood each year in order to test the resistance of new selections to the strain of Streptomyces scabies causing russet scab. Included in this plot in 1957 were 124 selections from the North Dakota Horticultural Department. The readings on this stock are shown in table 2.

N. Dak. table 1. Common scab and late blight tuber readings from the Fargo scab nursery. Underlined selections are entries included in the National Uniform Scab Trial.

Variety	Parentage	Total number tubers	Number of tubers showing types of scab infection					Tuber late blight
			0	1	2	3	4	
F26-1	Early Gem x B2876-1	84	81	3				-
ND3977-1	ND2910-1 x B3131-8	30	20	10				+
B2874-4	B606-37 x B56-1	34	29	4	1			-
B2162-36	B381-2 x 528-170	49	43	6	1			-
F26-5	Early Gem x B2876-1	85	77	7	1			+
Cherokee	X96-56 x 528-170	56	51	2	3			+
F26-2	Early Gem x B2876-1	56	44	9	3			+
B3897-11	NDB3081-2 x B2997-9	29	17	8	4			+
B3897-9	NDB3081-2 x B2997-9	37	27	5	5			+
B3307-4	B874-108 x B2131-3	82	67	8	7			+
B3876-25	B3097-8 x B3139-24	39	37	1		1		+
B2922-6	B607-72 x B598-27	14	10	3		1		+
F26-4	Early Gem x B2876-1	61	50	7	3	1		+
La1859	Pontiac x X96-56	47	35	4	7	1		No reading
B2368-13	Pontiac x B400-1	44	21	12	10	1		+
B3454-14	B2368-2 x B2368-17	22	2	6	13	1		+
B1396N2	B881-12 selfed	56	54			2		+
B3897-4	NDB3081-2 x B2997-9	22	14	3	2	3		+
B3964-1	Ac25966 x B929-32	15	4	4	4	3		+
B3319-30	B936-12 x Menominee	45	30	1	11	3		+
B3307-2	B874-108 x B2131-3	30	16	4	6	4		+
ND3982-1	ND2976-2 x B3131-8	50	14	26	6	4		+
B3832-20	B294-38 x B3139-24	41	22	8	6	5		+
I1379-1	ND457-1 x Osage	63	43	9	6	5		+
1801-10	B595-76 x B67-11	44	12	17	10	5		+
B3857-11	Saranac x B929-32	86	52	12	17	5		+
B3871-6	B595-76 x B3139-24	48	29	3	10	6		+
B3454-5	B2368-2 x B2368-17	36	14	2	14	6		+
F29-1	Early Gem x I803-3	168	140	14	7	7		-
B3453-2	B2368-2 x B2162-18	49	7	6	19	7		-
B3842-1	B982-23 x B294-38	67	42	8	13	14		+
F7-2	B2872-1 x B3131N1	82	21	20	21	20		+
B3114-52	B503-70 x B991-13	20	5	6	7	1	1	+
B3903-1	LaSoda x B2368-4	42	26	2	9	4	1	+
B3836-1	ND457-1 x B2938-22	52	14	7	18	12	1	+
ND3981-1	ND2976-2 x B2876-1	51	30	3	14	2	2	+
B3172-13	B982-16 x B991-13	40	24	5	3	6	2	+
F7-1	B2872-1 x B3131N1	104	20	17	38	26	3	+
B3849-10	B2834-3 x B3186-6	42	13	4	13	8	4	+
ND4073-1	B2876-1 x ND2976-2	72	24	17	8	17	6	+
B3627	B606-37 x B2067-52	69	22	7	16	16	8	+
B3837-11	B595-76 x B294-38	55	21	5	10	9	10	+

N. Dak. table 2. Common scab readings of North Dakota Horticultural Department selections grown at Northwood, N. Dak.

Pedigree	Parentage	Scab reading	Pedigree	Parentage	Scab reading
ND457-1-10	Sebago x Minn. 92.36-5	1-3	ND 3823-2	B2368-4x2387-1	2-3
" 457-1-16	" "	2-3	" 3830-2	B2368-10xRedkote	1-3
" 457-1-35	" "	2-2	" 3833-1	B2887-2x457-1-10	3-2
" 457-1-82	Self	5-2	" 3833-3	" "	2-4
" 457-1-10-15	"	2-2	" 3854-1	Osage x 2799-4	4-2
" 457-1-10-16	"	4-3	" 3858-1	1811-1x457-1-10	4-2
" 457-1-23-1	Sebago x Minn. 92.36-5	5-3	" 3913-5	Picka 45xRed Beauty	2-1
" 2774-3	625 x 799-9	5-3	" 3919-1	Early GemxBl396N2	4-2
" 2906-1	626 x Redkote	4-3	" 3919-2	" "	3-2C
" 2910-1	766-9 x 922	3-3	" 3919-10	" "	4-2
" 3022-18	B606-37 x ND457-1	1-4	" 3942-3	457-1-10x1801-10	4-2
" 3023-B-7	" "	1-3	" 3957-10	2475-8x457-1	1-3
" 3023-B-10	" "	3-3	" 3959-1	" x B2876-1	5-3C
" 3057-1	Minn. 24.43 x 922-1	5-2	" 3959-2	" "	2-2
" 3057-2	" "	5-3	" 3960-7	" x B3196N2	5-3C
" 3152-1	1207-3 x Cherokee	4-3	" 3960-9	" "	4-2
" 3307-2	Canso x B991-13	5-2	" 3962-8	2569-4xB2876-1	5-2
" 3324-2	Kennebec x 457-1	3-2	" 3965-2	" xB3131-8	2-3C
" 3409-1	2183-1 x 457-1	5-2	" 3965-9	" "	3-2
" 3440-2	2226-2 x B991-13	3-2	" 3967-1	2780-6xB2876-1	3-3C
" 3501-3	Early Gem x S108	0-0	" 3967-5	" "	5-2
" 3545-2	I803-1 x 457-1	4-3	" 3967-6	" "	3-2
" 3562-5	I870-1 x S108	0-0	" 3970-4	2780-8 x "	5-2
" 3569-1	I8167-2 x S108	0-0	" 3970-13	" "	5-2
" 3631-5	Nebr. 20.44-2 x 2200-1	1-3	" 3978-3	2910-1x457-1-10	5-2
" 3631-6	" "	2-2	" 3978-6	" "	3-2
" 3676-5	Russet Burbank x 457-1	0-0	" 3978-12	" "	4-2
" 3676-14	" "	1-3	" 3980-5	2972-2x457-1-10	1-5
" 3676-15	" "	3-3	" 3980-6	" "	4-2
" 3676-17	" "	Tr-2	" 3980-12	2972-2x457-1-10	2-2
" 3676-20	" "	0-0	" 4011-1	3247-2xB3131-8	3-3C
" 3676-21	" "	0-0	" 4011-2	" "	4-2
" 3676-25	" "	3-2	" 4019-1	3255-1x457-1-10	4-2
" 3676-27	" "	2-3	" 4019-4	" "	4-3C
" 3676-28	" "	2-3	" 4028-1	3291-5xB3159-1	3-3
" 3676-32	" "	3-3	" 4033-5	3295-6xB3131-8	3-2
" 3676-42	" "	4-2	" 4033-9	" "	1-3
" 3680-4	Russet Burbank x 1255-1	3-3	" 4033-13	" "	1-2
" 3707-1	92.49-2 x B2368-4	4-2	" 4049-4	B595-76x475M2	5-2
" 3740-1	2476-2 x Early Gem	3-3C	" 4055-1	B922-3x457-1-10	4-3C
" 3740-3	" "	3-3C	" 4061-5	B1359-1x457-1	5-2
" 3740-9	" "	3-3C	" 4066-4	B2067-133x457-1-10	2-3C
" 3740-11	" "	2-3C	" 4066-6	" "	1-3
" 3782-1	Early Gem x 457-1-10	5-2	" 4076-19	B3131N1x457-1	5-3C

continued

N. Dak. table 2, continued

Pedigree	Parentage	Scab reading	Pedigree	Parentage	Scab reading
ND4076-21	B3131N1 x 457-1	3-2	ND4105-4	B3333N1 x 457-1-16	2-3C
" 4077-2	" x 457-1-10	3-3C	" 4115-1	CS9947 x 457-1-10	1-4
" 4077-7	" "	1-3C	" 4121-4	I803-3 x 457-1-10	3-3C
" 4077-8	" "	4-2C	" 4121-20	" "	1-3C
" 4082-2	B3131N2 x 2910-1	4-3	" 4121-21	" "	1-3
" 4984-2	" x Redkote	4-2	" 4121-25	" "	3-2
" 4086-1	B3131N3 x 2910-1	2-2	" 4122-2	I947-W18 x 457-1	4-2
" 4086-2	" "	5-2	" 4122-7	I947-W18 x 457-1	5-3C
" 4091-1	" x Minn. 24	5-2	" 4122-11	" "	3-3C
" 4092-3	" x 475M2	5-2	" 4129-5	Minn. 15.46x2475-8	5-3C
" 4097-5	B3131-8 x 2910-1	2-2	" 4129-6	" "	5-3C
" 4099-3	B3137-13 x 457-1-10	4-2	" 4129-12	" "	4-3C
" 4099-11	" "	1-3	" 4133-2	Minn. 24x3185-1	4-2
" 4102-1	B3255N1 x 457-1	3-2	" 4136-15	" x I1049-3	4-3C
" 4103-1	B3333N1 x 457-1	5-2	" 4136-22	" "	4-2
" 4103-7	" "	4-2	" 4139-5	Mich. 1363x457-1	4-2
" 4103-14	" "	2-3C	" 4139-8	" "	3-2
" 4104-18	" x 457-1-10	2-3C	" 4140-10	") x457-1-10	5-2

Resistance to virus Y

In cooperation with the North Dakota Horticultural Department, several hundred selections bred and increased by R. H. Johansen, as well as some Federal selections, are planted at Fargo each year to determine their resistance to virus Y under field conditions. Selections that were tested in previous years and remained symptomless were included in the 1957 planting and observed for primary symptoms. Selections being tested for the first time were observed for current season symptoms as long as the vines remained in a suitable condition to observe infection.

The virus-Y-carrier ND530 was planted throughout the plot as a source of the virus and *Myzus persicae* was cultured in the greenhouse and distributed throughout the plot July 1.

Many North Dakota selections showed no virus Y symptoms in 1957 and only 3 of 15 Federal selections showed symptoms. The resistant B2067-52 was one of the 12 Federal selections not showing symptoms.

Resistance to *Phytophthora infestans*

Using culture SB of race 0, seedlings from 27 crosses were tested for the North Dakota Horticultural Department. The percentage of susceptibles for each cross are shown in table 3. Lal859 has been resistant to race 0 and when used in crosses it has shown ability to transmit this character to its progeny. The progeny from 3 of its crosses in table 3 remained free of the

disease while only 1 percent of them showed symptoms in another cross.

Additional stock from the Horticultural Department was tested for resistance by using detached leaves from selections growing in 8-inch pots. These data are given in table 4.

North Dakota experienced more late blight in 1957 than at any time during the past decade and possibly at any time since potatoes were grown in the Red River Valley. This provided an opportunity to take field readings on stock that had only been tested for resistance to race 0. Table 5 contains readings on stock obtained from Chapman Farm, Presque Isle, Maine, in 1956.

N. Dak. table 3. North Dakota Horticultural Department seedlings tested for resistance to race 0.

Pedigree	Parentage	Percent susceptible	Pedigree	Parentage	Percent susceptible
ND4777	ND3324-2 x W125.52	10	ND4899	ND4368-6 x La1859	0
" 4793	ND3676-28 x W141-52	10	" 4900	ND4371-8 x ND2853-3	3
" 4795	ND3676-33 x "	8	" 4901	ND4403-1 x "	5
" 4799	ND3676-42 x W125.52	50	" 4902	ND4403-2 x La1859	1
" 4800	" x W131.52	1	" 4912	ND3977-1 x ND457-1-10	25
" 4818	ND3967-1 x ND2853-3	25	" 4913	" x ND2853-3	5
" 4819	" x Norland	5	" 4914	" x Norland	30
" 4820	" x ND3982-1	20	" 4916	" x ND3962-8	20
" 4821	ND3967-6 x ND457-1-10	10	" 4924	ND3982-1 x ND3967-1	10
" 4822	" x ND2853-3	8	" 4926	ND4073-1 x "	0
" 4893	ND4139-4 x W125.52	5	" 4932	ND457-1-10 x W141.52	5
" 4897	ND4367-1 x La1859	0	" 4935	ND457-1-16 x W125.52	30
" 4898	ND4368-3 x "	0	" 4936	ND457-1-16 x W137.52	3
			" 4937	ND457-1-16 x W143.52	0

N. Dak. table 4. North Dakota Horticultural Department selections tested for resistance to race 0.

Pedigree	Parentage	Reaction	Pedigree	Parentage	Reaction
ND3959-1	ND2475-8 x B2876-1	-	ND4011-1	ND3247-2 x B3131-8	-
" " -2	" "	-	" 4028-1	ND3291-5 x ND3159-1	-
" 3962-8	ND2569-4 x B2876-1	-	" 4033-9	ND3295-6 x B3131-8	-
" 3965-2	" x B3131-8	-	" 4033-13	" "	-
" 3965-9	" "	-	" 4049-4	B595-76 x 475M2	-
" 3967-1	ND2780-6 x B2876-1	-	" 4055-1	B922-3 x ND457-1-10	-
" 3967-5	" "	-	" 4076-19	B3131N1 x ND457-1	+
" 3967-6	" "	-	" 4076-1	" "	-
" 3968-7	ND3780-6 x B3131-8	-	" 4077-2	" x ND457-1-10	-

continued

N. Dak. table 4, continued.

Pedigree	Parentage	Reaction	Pedigree	Parentage	Reaction
ND4077-7	B3131N1 x ND457-1-10	+	ND4105-10	B3131-N1 x ND457-1-16	+
" 4077-8	" "	-	" 4106-4	" x ND2475-13	-
" 4082-2	B3131N2 x ND2910-1	+	" 4121-4	Tawa x ND457-1-10	-
" 4084-2	" x Redkote	-	" 4121-20	" "	+
" 4086-1	B3131N3 x ND2910-1	-	" 4121-21	" "	+
" 4086-2	" "	-	" 4121-25	" "	-
" 4091-1	" x M24	-	" 3023-B-10	B606-37 x B922-1	+
" 4092-3	" x 475M2	-	" 3152-1	ND1207 x Cherokee	-
" 4097-5	B3131-8 x ND2910-1	-	" 3296-3	2TG-15 x GQT	-
" 4103-1	B3131-N1 x ND457-1	-	" 3307-2	Canso x B991-13	-
" 4103-7	" "	-	" 3324-2	Kennebec x ND457-1	+
" 4103-14	" "	-	" 3440-2	ND2226-2 x B991-13	+
" 4104-18	" x ND457-1-10	-	" 3545-2	Tawa x ND457-1	-
" 4105-4	" x ND457-1-16	+	" 3557-8	I870-1 x "	+

N. Dak. table 5. Reaction of Federal selections to late blight at Northwood, N. Dak.

Pedigree	Parentage	LB ¹	Pedigree	Parentage	LB ¹
B1435-14	B2068-23 selfed	1	B3696-13	B3097-16 x Ac.25959	-
B1467-2	B2331-5 selfed	2	B3710-1	Ac.25953 x X96-56	-
B1467-8	" "	1	B3719-1	" x B2331-5	-
B1467-9	" "	2	B3801-11	B606-37 x B24-58	-
B2894-24	Kennebec x Teton	-	B3807-12	B2944-65 x B2067-52	2
B3114-52	B503-70 x B991-3	-	B3813-30	B24-58 x 3VW-9	-
B3391-19	B859-10 x B24-58	4	B3814-23	" x B2067-52	3
B3401-25	B922-3 x Menominee	-	B3829-16	Houma x Katahdin	4
B3556-12	B595-76 x B24-58	-	B3833-24	B294-38 x B2209-25	2
B3599-8	B2935-7 x B3021-3	1	B3903-1	LaSoda x B2368-4	4
B3604-19	Saranac x B2395-14	1	B3925-7	B982-23 x B3209-35	4
B3626-13	B595-76 x B2067-52	1	B3964-1	Ac.25966 x B929-32	-
B3630-16	B2068-23 x "	3	41956	Selfed	3

¹/ Late blight readings: - = no symptoms; 1 = very slight, 2 = slight
3 = moderate and 4 = much.

Thirty-two Federal and North Dakota selections (Table 6) were exposed to field infection for the first time at Northwood. Only 5 remained free of foliage symptoms.

N. Dak. table 6. Reaction of Federal and North Dakota selections to late blight at Northwood.

Pedigree	Parentage	Reac tion	Pedigree	Parentage	Reac tion
F52-1	B1396N2 x B929-23	-	ND4189-2	A101-12 x ND2475-8	1
F52-4	" "	1	" 4189-3	" x "	3
F52-5	" "	1	" 4196-1	A119-11 x ND457-1-10	3
F52-8	" "	1	" 4200-1	A119-20 x "	4
F52-9	" "	1	" 4264-1	M24 x ND3023-B-3	4
F52-10	" "	2	" 4264-2	" x "	3
F52-12	" "	2	" 4319-1	ND457-1-10 x B3131-8	-
F52-13	" "	1	" 4333-1	ND2774-3 x B3131-8	1
F52-15	" "	1	" 4333-2	" x "	1
F52-16	" "	3	" 4351-1	ND2976-2 x "	-
F55-1	A119-1 x "	1	" 4359-1	ND3022-29 x ND2910-1	2
F61-1	I801-10 x Early Gem	-	" 4359-2	" x "	1
ND4172-1	Redkote x B2876-1	1	" 4371-1	ND3023-B-3 x B3131-8	1
" 4188-1	A101-12 x B1396N2	rogued	" 4371-2	" x "	2
" 4188-2	" x "	3	" 4404-1	ND3241-2 x "	-
" 4189-1	" x ND2475-8	1	" 4473	B3131-8 x ND2728-20	1

1/ = slight, 2 = moderate and 3 = much infection on foliage.

Twenty-one parental selections were grown at Northwood in a field where common scab and silver scurf are common. Late blight and maturity readings on this stock are given in table 7.

N. Dak. table 7. Late blight and maturity readings on parental stock grown at Northwood.

Pedigree	Parentage	Reac- tion	Maturity	Pedigree	Parentage	Reac- tion	Maturity
F26-1	Early GemxB2876-1	-	L	ND3324-2	B962-9xM113.1 *	ME	
F26-2	" x "	Tr	L	ND3435-17	ND2221-6xI8168-28+	M	
F26-4	" x "	-	ML	ND3491-1	Early GemxND2098-1*	E	
F26-5	" x "	-	ML	ND3562-5	I870-1xS108 *	E	
A180-24	" xB2756-2	+	L	ND3676-5	Russet Burbank		
A183-10	" xB986-7	+	LL		x ND457-1	+	M
B929-23	792-88 x B81-40	-	L	ND3676-20	Russet Burbank		
B1396N2	B881-12 selfed	+	L		x ND457-1	+	ML
La1859	Pontiac x X96-56	-	ML	ND3676-5	Russet Burbank		
B2834-3		+	M		x ND457-1	+	ML
B3131N2	B606-37 x B56-1	-	L	ND3680-2	Russet Burbank		
					x ND1255-1	+	M
				ND3681-4	Russet Burbank		
					x ND2098-1	+	ML
				ND3707-1	92.49-2 x B2368-4+	ML	

* Selections maturing too early to obtain late blight readings.

Dr. A. E. Kehr, Federal Horticulturist, Iowa State College, Ames, Iowa, increases and maintains advanced selections in a plot at Northwood each year. In order to obtain a higher degree of late blight resistance for the resistance program, the several hundred selections growing in this plot were observed when late blight was the most active. With the exception of TI5, 3XX-1 and X96-56, the selections listed in table 8 are early and medium in maturity and they showed no vine symptoms.

N. Dak. table 8. Selections from the Iowa plot at Northwood, N. Dak., showing no late blight on the foliage.

Pedigree	Parentage	Pedigree	Parentage
TI5	Not available	B3097-82	Kennebec x B991-13
3XX-1	" "	B3194-1a1	B595-76 x B936-12
X96-56	3895-13 x Earlane	B3408-27	B922-21 x B929-32
I912-6	B67-11 x I44-8-4	B3428-31	B606-37 x "
I913-2	B76-23 x B67-11	B3576-22	B2946-5 x "
I961-1	44-8-4 x X96-56	B3584-5	B3014-10 x "
I1019-7	X96-56 x M113.43	B3603-15	Saranac x "
I1077W28-5	M113.43 x GQT-1	B3692-4	B2919-1 x Ac.25952
I1114-2	B776-2 x B962-32	ND4160-1a1	Osage x ND3022-29
I1402-5	B595-76 x I1077-14	I5560-1	I1077W28-25 x Katahdin
B2162-36	B381-24 x X528-170	I5583-1	I1107-3 x "
B2896-10	Kennebec x B445-41	La6618-2	ND2910-1 x X96-56
B3097-16	Kennebec x B991-13	La6618-3	" x "
B3097-52	" x "	La6618-4	" x "
		B3698-10	B3160-12 x Ac25953

Immunity to virus X

Approximately 11,500 seedlings were inoculated with a virulent strain of virus X while growing in the greenhouse in 3½-inch pots. The progeny of each cross had one or both parents immune to this virus.

A tuber from each of 49 single hills harvested in 1956 was planted in the greenhouse January 1957. Soon after each plant emerged it was inoculated with a virulent strain of X. These plants were also tested for their resistance to race 0 of Phytophthora infestans and the results are given in table 9.

N. Dak. table 9. Reaction of 49 single-hill selections to virus X and race 0 of Phytophthora infestans.

Pedigree	Parentage	Skin color	Reaction to	
			X	LB
F51-1	Early Gem x B929-23	Russet	-	+
" 2	" "	"	-	+
" 3	" "	White	-	-
" 4	" "	Russet	+	-
" 5	" "	"	-	-
F52-1	B1396N2 x B929-23	White	-	-
" 2	" "	Russet	-	+
" 3	" "	"	-	-
" 4	" "	"	-	-
" 5	" "	"	-	+
" 6	" "	White	-	+
" 7	" "	Russet	-	-
" 8	" "	"	-	-
" 9	" "	"	-	-
" 10	" "	"	-	+
" 11	" "	White	-	-
" 12	" "	"	-	-
" 13	B1396N2 x B929-23	Russet	+	-
" 14	" "	"	-	+
" 15	" "	"	-	-
" 16	" "	White	-	+
F53-1	B1396N2 x I1060-1	"	+	+
" 2	" "	"	+	+
F55-1	A119-1 x B929-23	Russet	+	-
F61-1	I801-10 x B1396N2	"	+	-
ND4172-1	Redkote x B2876-1	Red	+	-
"4188-1	A101-12 x B1396N2	Russet	+	+
" " 2	" "	"	+	+
" 4189-1	" x ND2475-8	"	+	+
" " 2	" "	"	+	+
" " 3	" "	"	+	+
" 4196-1	A119-11 x ND457-1-10	"	+	+
" " 2	" x "	White	+	+
" 4200-1	A119-20 x "	Russet	+	+
" 4264-1	M24 x ND3023-B-3	Red	-	+
" " 2	" x "	"	-	+
" 4284-1	Red Beauty x B2876-1	"	+	+
" 4319-1	ND457-1-10 x B3131-8	White	-	-
" 4333-1	ND2774-1 x B3131-8	Red	-	-
" " 2	" x "	"	-	-
" " 3	" x "	"	-	-
" 4345-1	ND2910-1 x ND3023-B-3	"	-	+
" 4351-1	ND2976-2 x B3131-8	"	-	-
" 4359-1	ND3022-29 x ND2910-1	"	-	-
" " 2	" x "	"	-	-
" 4371-1	ND3023-B-3 x B3131-8	"	-	-
" " 2	" x "	"	-	+
" 4404-1	ND3241 x "	"	-	-
" 4473-1	B3131-8 x ND2728-20	"	-	-

Resistance to the aster yellows virus

It has been observed for many years that some varieties of potatoes only had a slight amount of purple-top wilt during years when the aster yellows virus was common. A typical example of this was shown in 1957 when the varieties Irish Cobbler, Russet Burbank and Early Gem showed a high degree of resistance when compared to the susceptible Red Pontiac. N. Dak. table 10 lists the purple-top readings on some selections being increased on the Mutchler Farm at Northwood.

N. Dak. table 10. Incidence of purple-top wilt on some advanced selections.

Pedigree	Parentage	Purple-top wilt	
		July 17	July 26
F7-1	B2872-1 x B3131N1	Much	Much
F7-2	" "	Moderate	Moderate
F29-1	Early Gem x Tawa	Very slight	Very slight
I801-10	B595-76 x B67-11	"	"
Red Pontiac		Moderate	Moderate
I1379-1	ND457-1 x Osage	None	Very slight
B1396N2	B881-12 selfed	"	None
B3627	B606-37 x B2067-52	Moderate	Moderate
B3836-1	ND457-1 x B2938-22	None	Very slight
B3842-1	B982-23 x B294-38	None	"
B3981-1	ND2976-2 x B2876-1	Slight	Slight
B3982-1	" x B3131-8	None	None
ND4033-1	ND3295-6 x B3131-8	Slight	Slight

Three selections showed no symptoms and 5 others had a very slight amount. The selection F29-1 probably inherited some or all of its resistance from Early Gem. The russet selection B1396N2 has been used extensively as a parent.

Seed increase for Texas trials

New selections and varieties were obtained from various sources and increased in a plot at Northwood for trials in Texas. The 17 selections and varieties in table 11 were selected for the test.

The Northwood seedling plot

Approximately 6,000 seedlings were grown in the 1957 seedling plot at Northwood. In addition to the Federal stock developed at Fargo and received from R. V. Akeley, seedling tubers were obtained from R. H. Johansen and Dr. A. E. Kehr.

Disease resistance

The principal objective of the Federal program at Fargo is the development of disease resistance in new stock. Attention has been given to the diseases caused by Streptomyces scabies, Phytophthora infestans, Spondylocadium atrovirens, and viruses X, Y and aster yellows. The 77 parental combinations were made in order to develop progenies having multiple resistance.

N. Dak. table 11. Selections and varieties selected for the Texas trials.

Variety	Color	Matur- ity ^{1/}	Resist- ance	Variety	Color	Matur- ity ^{1/}	Resist- ance
Red Pontiac	Red	ML	None	Wis.125.52	Wh.	M	Sc
Red LaSoda	Red	ML	None	ND3324-2	Wh.	E	Sc
Norland	Red	E	Mod. Sc	B3626-13	Wh.	ML	Lb, Sc
Norgleam	Wh.	E	Y	ND3631-6	Red	M	Sc
Waseca	Red	E	None	ND3701-1	Red	M	Sc
F29-1	Wh.	M	Lb, Sc, X	B3710-1	Wh.	ML	Lb
La92-10	Wh.	ML	Sc	ND3981-1	Red	ML	Lb, Sc, X
B605-10	Wh.	E	Lb, Sc	ND3982-1	Red	ML	Lb, Sc, X
I801-10	Wh.	L	Lb, Sc, X				

^{1/} E = early, M = medium; L = late.

N. Dak. table 12. Pedigrees of seedlings planted in the Northwood seedling plot.

Pedigree	Parentage	Resist- ance	Pedigree	Parentage	Resist- ance
F75	Early Gem x F26-2	Lb, Sc, X	ND4006	ND3202-1xB3131-8(Self)	Lb, X
F76	" x ND4096-1	" " "	ND4011	ND3247-2x " "	" " "
F77	3XX-1 x ND3562-2	" " "	ND4044	ND3297-2xI801-10	" " "
F79	3WM-19 x F26-2	" " X	ND4169	Redkote x La1859	" " "
F81	F26-2 x ND3562-2	" " "	ND4179	Red Pontiac La1859	" " "
F86	All6-164 x F26-2	" " "	ND4303	475M2xLa1859	" " "
F87	" x ND3981-1	" " "	ND4347	ND2910-1xLa1859	" " "
F88	" x ND4096-1	" " "	ND4381	ND3057-6xB3131-8	Lb, Sc, X
F90	I801-10 x B1396N2	" " "	ND4400	ND3241-2xLa1859	" " "
F91	" x ND3562-2	" " "	ND4435	ND3295-6xB3131-8	" " "
F94	B1396N2 x F26-2	" " "	ND4490	RedkotexND3295-4	" " "
F97	" x ND4096-1	" " "	ND4504	B3131N2xND2906-1	Lb, Sc, X
F99	La1859 x ND3981-1	" " "	ND4524	La1859xND3842-3	" " "
F100	B3131N2 x "	" " "	ND4527	GQT1-3xND2906-1	" " "
F103	ND3435-17 x F26-2	" " "	ND4530	I803-3x "	" Sc, X
F104	" x I803-3	" " "	ND4536	AntigoxLa1859	" " "
F106	" x ND3981-1	" " "	ND4542	" xND3023-B-3	X
F107	" x ND4096-1	" " "	ND4564	ND2853-3xB3131N2	Lb, Sc, X
F108	ND3501-3 x F26-2	" " "	ND4565	" xLa1859	" " "
F110	ND3562-2 x "	" " "	ND4567	" xND3981-1	" " "
F111	" x ND3981-1	" " "	ND4572	ND2883-5x "	" " "
F112	" x ND4096-1	" " "	ND4574	ND2906-1xLa1859	" " "
F113	B3651-8 x ND3562-2	" " "	ND4575	" xF19-2	" " "
F117	ND3977-1 x La1859	" " "	ND4578	" xND3981-1	Lb, Sc, X
F119	ND3977-2 x ND3981-1	" " "	ND4583	ND2910-1x "	" " "
F121	ND4096-1 x ND3562-2	" " "	ND4585	ND3023-BxLa1859	" " "
ND3965	ND2569-4 x B3131-8(Self)	Lb, X	ND4589	" xND3981-1	" " "

continued

N. Dak. table 12, continued

Pedigree	Parentage	Resistance
ND4591	ND3023-B-10 x B3131N2	Lb, Sc, X
ND4593	" x Antigo	Sc, X
ND4594	" x ND2853-3	X
ND4595	ND3023-B-10 x ND3981-1	Lb, Sc, X
ND4599	ND3057-2 x ND2910-1	
ND4614	ND3367-1 x ND3981-1	Lb, Sc, X
ND4616	ND3545-1 x "	" " "
ND4627	ND3842-3 x La1859	" "
ND4629	ND3900-1 x "	" "
B1515	B929-32 selfed	" " A
B1516	B2067-52 selfed	A, Y
B1524	B3720-9 selfed	
B4229	Cayuga x Cherokee	Lb, Sc, A, NN
B4231	" x B3319-20	Lb, A, X, VW
B4239	Houma x B3556-12	Lb, S, X, VW, LR
B4244	Merrimack x B3139-24	Lb, A, Y, NN, RR
B4249	Mohawk x Ac26032	Lb, A, VW
B4250	ND457-1 x B3139-24	Lb, Sc, Y, RR
B4251	" x B3209-35	A, Y,
B4252	" x Ac26031	Lb, Y
B4257	Sebago x B3672-3	Lb, Sc, A, VW, NN
B4260	B24-58 x B3139-24	Lb, Sc, RR, A, Y, LR
B4264	" x B3556-12	Lb, Sc, X, A, VW, LR
B4273	B595-76 x ND457-1	Lb, Sc, X, A, VW, NN, Y
B4279	B606-37 x ND457-1	Lb, X, A, Y, S
B4281	" x B3309-8	Lb, Sc, X, A, Y, S
B4283	627-164 x B3139-24	Lb, Sc, RR, Y
B4286	B725-6 x "	Lb, Sc, RR, Y
B4292	B926-9 x B3556-12	Lb, Sc, A, X, VW, RR
B4299	B991-14 x B3556-12	Lb, Sc, A, X, VW, LR, RR
B4300	B2067-52 x B3209-35	A, Y
B4303	B3097-82 x Menominee	Lb, Sc, RR, A, VW
B4309	B3209-35 x B2067-52	A, Y
B4316	B3454-4 x B3139-24	Lb, Sc, RR, A, Y
B4318	B3641-18 x B2067-52	A, Y
B4333	B2962-6 x B1172-16	X, Y, LR
B4340	B929-6 x ND457-1	Lb, Sc, X, A, Y
I115	I1312-3 x La1859	Lb, Sc, X
I144	B595-76 x I801-10	Lb, Sc, X, VW
I146	B605-10 x B962-32	Lb, Sc
I153	B595-76 x B2368-4	Lb, Sc, X, VW
I162	B922-6 x I1092-2	Lb, Sc, RR
I163	B922-6 x I1027-18	Lb, Sc, X
I170	B1396N2 x Katahdin	Sc, Y, A, LR
I197	B2368-4 x Picha 40	Sc
I205	B2875-8 x I1077W28-5	Lb, Sc, X
I243	B3131-8 x B2834-3	Lb, Sc, X, LR

continued

N. Dak. table 12, continued

Pedigree	Parentage	Resistance
I260	Cherokee x B2903-17	Lb, Sc, LR
I263	Cobbler x B2903-17	Lb, Sc, LR
I264	" x B3131-8	Lb, Sc, X
I282	X927-3 x ND457-1	Y, LR
I291	Saco x B2834-3	Lb, Sc, X, LR, A
I295	Lal354 x ND457-1	Y
I297	" x X96-56	Lb, Sc
I313	Norland x B2903-17	Lb, Sc, LR
I387	Red Pontiac x Redkote	Sc
I5614	I8140 x B3131-8	Lb, Sc, X
Nebr. 284.55	Nebr. 215.50-2 x 164.51-2	Sc

NORTH DAKOTA

Robert Johansen, Nick Sandar, Cosimo Cotrufo and E. P. Lana

The problem, objectives, and plan of work in potato breeding for North Dakota remain essentially the same as reported in the 1951 report.

Potato Crossing Program

During March and April of 1957, 314 crosses were made in the greenhouse. Parents used in the crossing program possessed a high degree of resistance to late blight, scab, virus X and virus Y. Combined disease resistance, red color, russeting, type, and quality were the objectives in most crosses. Seed was extracted during May and June. Production of seed from most crosses was good.

Greenhouse and Field Seedlings

Twenty-five thousand three hundred potato seedlings were grown in 3-inch pots in the Horticulture greenhouse. Seedlings were transplanted in August and harvested during October and November. The size of the seedling tubers was excellent.

In a test for disease resistance, 72 seedling families were inoculated with a virulent strain of virus X and 32 seedling families were inoculated with the "O" race of late blight. Several of these seedling families were inoculated with both late blight and virus X.

Thirty-one of the seedling families grown were progenies of crosses using the virus Y resistant selection ND 457-1 as a parent. Virus Y resistance of these families will be determined at a later date.

Seventeen thousand seedlings representing 166 families were grown in the field at the Langdon Experiment Station. Approximately 500 seedlings were selected at harvest for further study and evaluation. A high percentage of the seedlings selected possessed red skin color.

Advanced Selections

Seven hundred twenty advanced selections were grown under isolation from virus diseases at the Langdon Experiment Station and were harvested as basic seed stocks. Duplicate samples of most of these selections were grown at Grand Forks, Park River, Northwood and Fargo. Records were taken on their disease resistance and general performance but these were not saved for seed. An additional twenty-one varieties and 56 selections from other States were evaluated in an adaptation plot at Grand Forks.

Approximately 3,000 second-size seedling tubers were distributed to co-operators in other States for selection.

A summary of seedlings and selections grown and those saved for further testing follows:

<u>Age of Clone</u>	<u>Number Grown</u>	<u>Approximate No. Saved</u>
1st year seedling	17,000	500
2nd year	555	116
3rd year	91	34
4th year and older	74	50

In trials conducted throughout the State, advanced selections ND 3707-1R, ND 3631-6R, ND 3740-3 Russ, ND 3324-2, ND 3307-2, ND 3676-20 and ND 3676-21 were found to be the most outstanding selections. ND 2774-3R and ND 3324-2 were distributed to foundation seed growers.

New Varieties

Three new potato varieties, Norland (ND 2906-1R), Norgleam (ND 457-1-16), and Nordak (ND 457-1-10), were released in 1957 by the Horticulture Department, North Dakota Agricultural College. Early maturity of the vines and the ability to produce high marketable yields early in the season are important characteristics of all three varieties. In maturity, Norland and Nordak are similar to Red Warba while Norgleam resembles Irish Cobbler. The characteristics of these varieties follows:

Norland - Very early maturing, red skin, moderate scab resistance, late blight susceptible, good yield, fair to good cooking qualities, and good tuber type.

Norgleam - Early maturing, white skin, scab and late blight susceptible, good tuber type, good yield, excellent cooking qualities, and field resistance to virus Y.

Nordak - Very early maturing, scab and late blight susceptible, good tuber type, good yield, excellent cooking qualities, and field resistance to virus Y.

During 1957 all three varieties were grown by foundation seed growers with Norland having the largest increase. In North Dakota, approximately 10 to 12,000 bushels of Norland, 100 bushels of Norgleam and 1,000 bushels of Nordak were harvested from the 1957 potato crop.

Testing for Disease Resistance

Scab - In cooperation with Dr. W. G. Hoyman, Department of Plant Pathology, 125 advanced selections were grown at Fargo and 425 at Northwood. Heavy September rains and late blight caused severe damage to the Fargo scab plot. Favorable scab tests were obtained at Northwood with approximately 15 to 20 selections showing some resistance to russet scab.

Late Blight and Virus X - 195 second year and 51 third year and older selections were tested in the greenhouse during March and April 1957 for resistance to late blight and virus X. One hundred forty-four of the second year selections expressed no symptoms when inoculated with the "O" race of late blight while 96 selections expressed immunity to virus X. Sixty-seven showed resistance to both virus X and the "O" race of late blight.

Results obtained from previously testing third year and older selections indicated that 35 selections remained resistant to the "O" race of late blight; eleven selections showed immunity to virus X; while 8 selections showed resistance to both late blight and virus X.

Chipping Qualities

(Chipping Tests - Early Harvest Trial, 1957)

In 1957 a non-replicated planting of 6 named varieties and 2 selections were grown at Grand Forks and Park River and chipped at two dates, August 15 and August 30. From a 6-tuber sample, chips were prepared one and seven days after each harvest. Chips were scored for color using an arbitrary scale of 1-6 (1-very dark brown, 6-very light brown). Yield of chips was calculated as a percentage of peeled-raw-sliced-potato weight.

The average color rating and yield of the chips of all sample lots are shown in Johansen table 1. At both locations, ND 2774-3R, Norland, Manota, Cobbler, Kennebec and Norgleam yielded chips of attractive color. Chip color of ND 2774-3R and Norland was comparable or better than the standard chipping varieties Cobbler and Kennebec. Chip color of Norgleam and Manota was comparable to Kennebec while Nordak resembled Cobbler. At Grand Forks, ND 3324-2 yielded chips of very attractive color. Most all varieties and selections produced chips of attractive color when chipped directly after harvest. However, some varieties, like Nordak and Kennebec, produced chips of a darker color when chipped 7 days following harvest. This was especially true on the August 15 harvest date. Little differences were noted in chip color between the 15 and August 30 harvest dates.

Nordak, Manota, ND 2774-3R, ND 3324-2 and Cobbler produced the highest chip yield. Chip yields were the highest when samples were chipped on the later harvest date and when chipped one day following harvest.

(Chipping Tests - State Trials, 1956)

Twenty-two varieties and selections grown at Park River and Grand Forks in 1956 were chipped during March and April 1957. Prior to chipping, samples were conditioned at approximately 60 to 70 degrees F. for 12, 24, and 40 days. Color and yield of chips was determined. At both locations ND 2774-3R, ND 3324-2, Nordak, Norgleam and Norland made acceptable chips. ND 2774-3R yielded chips of the lightest color. In tests for the past 2 years ND 2774-3R has consistently produced the lightest colored chips.

Variety Trials

(State-Wide Potato Variety Trial)

Six replicated variety trials were grown in North Dakota during 1957. These were located at Fargo, Park River, Grand Forks, Minot, and with and without irrigation at Williston. However, due to a period of hot weather during July and August and excessively heavy rains during September, the Fargo trial was a complete failure.

Trials were planted as randomized blocks with 4 replications of 25 hills each per variety.

Fertilizer applied, soil type, planting date, and harvest date at each location follows:

Location	Fertilizer Applied	Soil Type	Planting Date	Harvest Date
Fargo	None	Fargo Clay	May 16	--
Grand Forks	150#/acre 16-16-8	Bearden Clay Loam	May 13	September 24
Park River	150#/acre 16-16-8	Glyndon Silt Loam	May 14	September 17
Minot	None	Loam	May 16	September 19
Williston	195#/acre	Havre Silty Clay	May 17	September 26
Irrigation	33.5-0-0	Loam		
Williston	166#/acre	Williston Loam	May 16	September 23
Dryland	0-45-0			

Nine varieties were grown in trial at Williston and Minot while the number of varieties grown at Grand Forks and Park River was 22 and 16, respectively.

At the 5 locations, Cobbler was the highest average-yielding variety in trial. Little differences in yield existed between the standard variety Red Pontiac and the three new varieties, Norland, Nordak, and Norgleam. The white selection ND 3324-2 produced yields higher than Nordak and Norgleam. The only consistently low-yielding selection or variety in trial was ND 2774-3R. At Park River and Grand Forks, Kennebec and ND 3307-2 produced good yields. Other outstanding varieties and selections that were grown at the two locations were ND 3631-6R, Red LaSoda, ND 3023-B-10R, and ND 3676-25. Huron, a new variety from Canada, produced an average yield of 268 bushels at Grand Forks and Park River. This variety was found to be quite scab-resistant but was lacking in tuber type and shape. ND 3631-6R and Red LaSoda produced tubers that were of good red color. However, in comparison to other advanced selections, both were lacking in tuber type and uniformity.

Higher yields were produced at Park River than at Grand Forks. Rainfall, occurring at a critical time, was no doubt a contributing yield factor at Park River. Very low yields were also produced at Minot under dry conditions. Yields of the irrigation trial at Williston averaged 210 bushels more than

the dryland trial. Total yield in bushels per acre and hundredweight may be found in Johansen table 2.

The earliest-maturing varieties in trial were Norland and Nordak. These varieties matured almost $2\frac{1}{2}$ weeks earlier than Red Pontiac. The latest maturing varieties in trial were Kennebec, ND 3676-33, ND 3676-20, and ND 3680-4. ND 3324-2, a selection resulting from a cross between Kennebec and ND 457-1 matured about 2 weeks earlier than Kennebec. This selection has about the same general characteristics as Kennebec.

The most scab-resistant varieties in trial were Early Gem, Huron, Norland, ND 3631-6R, ND 3676-20, and ND 3324-2. At most locations the two recently named varieties, Nordak and Norgleam, showed a high degree of susceptibility to pitted scab. This has been true for the past several years.

Based on all trials, the three white-skinned varieties and selections, Nordak, Norgleam and ND 3324-2, were the highest in specific gravity. The new red-skinned variety Norland was somewhat higher in specific gravity than Red Pontiac and Red LaSoda.

Specific gravity readings were very similar at Grand Forks, Park River, and Minot. However, significantly higher specific gravity was found at Williston dryland. In comparison to dryland vs. irrigation at Williston a much higher specific gravity existed in the dryland trial. Data on specific gravity and total solids are presented in Johansen table 3.

(Red-Skinned Potato Variety Trial)

For the 5th consecutive year a red-skinned potato variety trial was grown at Grand Forks, North Dakota. The variety trial grown in 1957 consisted of 13 unnamed selections and 7 named varieties. Of the advanced selections grown, seven were from the Horticulture Department, North Dakota Agricultural College, and one entry each from Mr. Harry Long, Park River, and Mr. Ben Picha, Grand Forks, North Dakota. Red sport of Triumph was supplied by Mr. Einar Larson, St. Thomas, North Dakota.

Advanced selection ND 3631-5R was the highest yielding selection or variety in trial. This selection was followed in yielding performance by Triumph and Red Pontiac. Yields of Norland were higher than Red LaSoda, Redkote, and Red Warba but not higher than Triumph or Red Pontiac. Regular Triumph yielded an average of 94 bushels more than the red sport of Triumph. However, the red sport of Triumph did have a considerably darker red color than the regular Triumph. ND 3707-1R produced yields comparable to that of Triumph and Red Pontiac. Selections and varieties producing very low yields were Red Beauty, Picha 40, and ND 2774-3R.

ND 3631-6R, ND 3707-1R, Redkote, and Norland expressed the most resistance to scab while Long No. 2, Red Pontiac, and ND 2774-3R were the most susceptible. No selection or variety expressed any high degree of resistance to silver scurf. However, the early maturing varieties were the most susceptible. This was particularly true with the selection ND 2774-3R.

Long No. 2 and Red Warba were the highest in total solids and specific gravity. Little differences existed in the remaining varieties and selections.

Red Warba, Norland, Picha 40, red sport of Triumph, and ND 2774-3R were the earliest maturing varieties and selections. Yield, specific gravity, and total solids are found in Johansen table 4.

(North Central Regional Variety Trial)

The North Central Regional Variety Trial grown at Grand Forks consisted of 22 varieties and selections. The results of this trial are reported cooperatively by the North Central States.

Virus Y Resistance (Contributing Project to NC-35 - The Nature of
Virus Y Resistance in the Potato Selection ND 457-1 and Some of
Its Progenies).

Twenty-six hundred clones from 27 crosses utilizing ND 457-1 or ND 457-1-10 as either a female or male parent were grown in the greenhouse in two lots during the winter of 1956-57. These were infected with virus Y by using viruliferous aphids (Myzus persicae Sulz.). The first lot involving about one-third of the material was quite advanced in growth before the aphid population was transferred from the ND 530 virus-Y-carrier. Four-hundred sixty-five plants showed no symptoms, 304 had symptoms and 40 were doubtful. On the second planting, the aphids were transferred from ND 530 as soon as the sprouts emerged. One thousand thirty-five showed no symptoms, 504 symptoms, and 292 were doubtful. Symptomless individuals were present in all but two crosses. There was a considerable range of symptom expression among the various progenies. ND 457-1 and ND 457-1-10 showed some agreement in ratios of no symptoms to susceptible plants. One thousand four hundred fifty greenhouse clones showing no symptoms or doubtful reactions were planted in the field for testing under natural conditions. One hundred clones showed current-season virus-Y symptoms before the area was lost due to excessive moisture.

Another test consisting of 308 three-year and older advanced clones were grown in 5 plant lots in the field. Under field conditions, 70 showed primary virus-Y symptoms by July 3. Ninety-four clones showed current-season infection. The remainder were dug for further test next season.

Johansen table 1. Early harvest chipping trials, 1957. Chipping quality of 8 varieties grown at Grand Forks and Park River.

	Harvested August 15				Harvested August 30				Average of four tests
	Number of days potatoes were conditioned following harvest				Number of days potatoes were conditioned following harvest				
	1 day	7 days	1 day	7 days	1 day	7 days	1 day	7 days	
	Yield ^{1/}	Color ^{2/}	Spec. Grav.	Yield ^{1/}	Color ^{2/}	Spec. Grav.	Yield ^{1/}	Color ^{2/}	
GRAND FORKS									
ND 2774-3R	32.4	31.4	6	6	35.0	34.6	6	6	33.4
ND 3324-2	32.6	29.0	5	5	36.2	34.5	6	5	33.1
Nordak	33.6	31.5	5	5	34.6	33.0	5	3	33.2
Norgleam	31.4	28.0	4	3	35.2	34.2	4	4	32.2
Norland	31.6	29.5	6	6	31.9	30.3	6	6	31.0
Cobbler	30.9	29.0	3.5	3	35.3	34.4	5	4.5	32.4
Kennebec	29.7	27.5	6	3	32.4	32.5	6	4	30.5
Manota	32.6	32.3	5	4.5	35.5	34.0	5	5	33.6
Average	31.9	30.0	5.1	4.3	34.5	33.4	5.4	4.7	32.4
PARK RIVER									
ND 2774-3R	33.1	31.0	6	6	35.0	34.2	6	6	33.3
ND 3324-2	30.9	30.5	4.5	5	37.1	35.3	4.5	5	33.5
Nordak	34.4	30.6	5	4	37.5	36.7	6	6	34.8
Norgleam	32.4	31.0	6	5.5	35.3	35.5	5	6	33.6
Norland	33.6	28.8	6	5	35.0	33.0	6	6	32.6
Cobbler	35.0	30.7	6	5	35.4	36.2	5	6	34.3
Kennebec	32.7	29.6	6	5	35.4	34.0	6	6	32.9
Manota	33.9	32.4	6	5	34.8	35.8	6	6	34.2
Average	33.3	30.6	5.7	5.1	35.7	35.1	5.6	5.9	33.7

^{1/} Percent based on 100 pounds of potatoes.

^{2/} Color score 1-6 (1 poor-dark, 6 good-very light brown).

Johansen table 2. Marketable yield in bushels per acre and cwt. of varieties and selections grown in State-wide potato variety trials, 1957.

Variety	Grand Forks		Park River		Minot		Williston				Average Yield	
	Cwt.	Bu.	Cwt.	Bu.	Cwt.	Bu.	Dryland		Irrigation		Cwt.	Bu.
Cobbler	197	329	216	360	108	180	99	162	287	469	181	300
ND 3324-2	156	259	222	369	72	120	92	151	267	437	162	267
Red Pontiac	167	278	217	361	86	143	123	201	249	408	168	278
Norgleam	184	307	220	367	69	115	100	164	214	351	157	261
Norland	157	262	203	331	93	155	139	227	233	381	165	271
Nordak	162	269	212	352	74	123	104	170	219	359	154	255
ND 2774-3R	67	112	123	205	54	90	103	169	121	198	94	155
Early Gem					101	169	125	205	406	664	211 ^{1/2}	343 ^{1/2}
Manota					51	85	90	147	131	214	91 ^{1/2}	149 ^{1/2}
Kennebec	184	307	226	376							205 ^{2/3}	342 ^{2/3}
ND 3307-2	154	257	220	366							187 ^{2/3}	312 ^{2/3}
ND 3023-B-10R	159	265	188	313							174 ^{2/3}	289 ^{2/3}
Red LaSoda	146	243	191	318							169 ^{2/3}	281 ^{2/3}
Huron	148	246	177	295							163 ^{2/3}	271 ^{2/3}
ND 3680-4	133	222	204	340							169 ^{2/3}	281 ^{2/3}
ND 3631-6R	130	216	152	253							136 ^{2/3}	235 ^{2/3}
ND 3501-3	108	179	157	261							133 ^{2/3}	220 ^{2/3}
ND 3676-20	83	138	150	250							117 ^{2/3}	194 ^{2/3}
ND 3152-1	152	252										
ND 3676-25	152	253										
ND 3676-5	104	174										
ND 3676-33	93	155										
Average	141	236	192	320	79	131	108	177	236	387	151	250
L.S.D. .05	6.7	11.3	32.2	53.7	6.8	11.4	7.5	12.3	14.2	23.3		
.01	9.0	15.0	43.1	71.7	9.2	15.3	10.2	16.7	19.3	31.6		

^{1/} Average 3 locations

^{2/} Average 2 locations

Johansen table 3. Specific Gravity and total solids of potatoes grown in State-wide variety trials in 1957.

Variety	Grand Forks		Park River		Minot		Dryland		Williston		Irrigation		Average	
	Spec. Grav.	Total Solids	Spec. Grav.	Total Solids	Spec. Grav.	Total Solids	Spec. Grav.	Total Solids	Spec. Grav.	Total Solids	Spec. Grav.	Total Solids	Spec. Grav.	Total Solids
Cobblers	1.090	21.9	1.086	20.8	1.090	21.9	1.099	23.7	1.083	20.3	1.0896	21.7		
Nordak	1.078	19.3	1.085	20.7	1.089	21.5	1.096	23.0	1.077	19.0	1.0850	20.7		
Norglean	1.080	19.6	1.085	20.7	1.090	21.9	1.091	22.0	1.075	18.5	1.0842	20.5		
ND 3324-2	1.080	19.6	1.082	20.1	1.080	19.6	1.099	23.7	1.080	19.6	1.0842	20.5		
ND 2774-3R	1.082	20.1	1.080	19.6	1.077	19.0	1.088	21.4	1.076	18.7	1.0806	19.8		
Norland	1.074	18.4	1.070	17.5	1.076	18.7	1.084	20.5	1.068	17.1	1.0744	18.4		
Red Pontiac	1.072	17.8	1.068	17.1	1.071	17.8	1.080	19.6	1.065	16.5	1.0712	17.8		
Manota					1.086	20.8	1.092	22.2	1.069	17.3	1.0823	20.1		
Early Gem					1.080	19.6	1.087	21.1	1.076	18.7	1.0810	19.8		
ND 3676-20	1.077	19.0	1.084	20.5							1.0805	19.72		
ND 3307-2	1.079	19.5	1.079	19.5							1.0790	19.52		
ND 3023-B-10R	1.078	19.3	1.080	19.6							1.07902	19.52		
Huron	1.078	19.3	1.077	19.0							1.07752	19.12		
ND 3631-6R	1.076	18.7	1.079	19.5							1.07752	19.12		
Kennebec	1.072	17.8	1.075	18.5							1.07352	18.12		
Red LaSoda	1.070	17.5	1.075	18.5							1.07252	18.02		
ND 3501-3	1.074	18.4	1.070	17.5							1.07202	17.92		
ND 3680-4	1.071	17.8	1.071	17.8							1.07102	17.82		
ND 3676-5	1.086	20.8												
ND 3676-33	1.074	18.4												
ND 3152-1	1.073	18.1												
ND 3676-25	1.072	17.8												
Average	1.0768	18.95	1.0778	19.18	1.0821	20.09	1.0907	21.91	1.0743	18.41	1.0782	19.24		
L.S.D. .05	.002	.38	.001	.17	.003	.60	.001	.35	.002	.44				
L.S.D. .01	.003	.51	.002	.23	.004	.88	.002	.50	.003	.64				

1/ Average 3 locations

2/ Average 2 locations

Johansen table 4. Red skinned potato variety trial. Marketable yield in bushels and cwt. per acre, and total solids of varieties and selections grown at Grand Forks, North Dakota, 1957.

Variety	Yield per acre		Specific Gravity	Total Solids
	Cwt.	Bu.		
ND 3631-5R	158	262	1.073	18.17
Triumph	147	244	1.073	18.17
Red Pontiac	140	232	1.073	18.17
ND 3906-1R	137	229	1.080	19.58
ND 3707-1R	126	210	1.076	18.82
ND 3023-B-10R	122	203	1.079	19.46
ND 3640-19R	117	194	1.073	18.17
Long No. 2	117	194	1.083	20.25
ND 2910-1R	114	190	1.078	19.32
ND 3699-5R	108	180	1.078	19.32
ND 2906-1R (Norland)	98	164	1.071	17.80
ND 3747-5R	91	152	1.082	20.10
Triumph sport	91	150	1.073	18.17
ND 3631-6R	76	127	1.072	17.97
Red Warba	87	144	1.083	20.25
Redkote	78	130	1.075	18.55
Red LaSoda	73	121	1.072	17.97
Picha 40	57	95	1.076	18.82
ND 2774-3R	43	72	1.073	18.17
Red Beauty	57	95	1.076	18.82
Average	102	170	1.076	18.82
L.S.D. .05	7	11	.001	.14
.01	9	15	.002	.20

OHIO
J. P. Sleesman

Potato leafhopper populations were larger than usual in 1957 and unsprayed susceptible varieties were severely damaged by hopperburn. Flea beetle populations were smaller than normal. Late blight became epidemic in late August and September, killing many plants prematurely.

Approximately 1,200 first year seedlings, representing 11 progenies, were obtained from Drs. Akeley and Kehr. A severe outbreak of late blight killed 90 percent of the seedlings and most of those that were immune and/or highly resistant to the disease either failed to produce tubers or the tubers were small and illshaped. In general, the blight resistant seedlings were lightly populated with the potato leafhopper and resistance to these pests was correlated with late maturity. About 4 percent of the seedlings were saved for further testing in 1958.

About 85 advanced seedling selections were planted at Wooster in single rows 15 feet in length. Of these, 36 were attacked by late blight in varying degrees of severity and many of the remaining seedlings escaped infection because they either matured before the disease was initiated or they were killed by the leafhopper. Seedlings from the cross OB 3672-6 x OB 3672-5 (parentage of OB 3672 is S. chacoense x Menominee) x Cherokee) usually were resistant to late blight. There was considerable variation among the seedlings in resistance to leafhopper attack and to hopperburn. Leafhopper populations ranged from 7.5 nymphs per leaf in the most susceptible seedlings to 0.6 nymphs for the most resistant sorts. Seedling OB 3957-2 (parentage Ac. 25953 x Teton) was the most resistant to the potato leafhopper and no late blight lesions were found on the foliage up to the time the plants were killed by frost. The vines of this seedling were very large and the tubers rough.

Data collected in previous years show that some of the wild species of *Solanum* are resistant to insects. Species hybrids provided by Drs. Buck and Hougas were planted at Wooster and data were obtained on leafhopper populations, hopperburn, flea beetle injury, and late blight resistance. These data are summarized in Ohio tables 1, 2, and 3. A high degree of resistance to leafhoppers and late blight is indicated in many of the hybrids.

Scab resistant varieties and/or seedlings were provided by the Michigan Seed Potato Growers Exchange, Dr. Kehr, and Dr. Rieman (see Ohio table 4). These were planted in a heavily scab-infested muck area on the Stambaugh farm at Celeryville. Each variety was planted by the cooperating grower in duplicate 50-foot single row plots. Every other row was planted to Katahdin as a check row. Samples at harvest time were collected by picking up 1/2 bushel of tubers at random from each plot and compositing into one sample. The tubers were scored to determine the percentage falling in each of 6 classes according to the size of the area covered with scab. The best seedling from the standpoint of both tuber appearance and scab resistance was Wisconsin x 137.52. Seedling Wisconsin x 143.52 was next best. The tubers of Tawa, Onaway, Saco and Michigan 139-9 were irregular in shape and tended to be flat. Those of Antigo were too small.

Ohio table 1. Leafhopper, flea beetle, and late blight resistance in species hybrids provided by Dr. Buck, Wooster, Ohio, 1957.

Species hybrids	Nymphs per leaf	Hopper- burn ^{1/}	Flea Beetle	Late blight ^{2/}
			Holes per leaflet	
BW 148-2	0	1	1.8	4
BW 148-3	0	1	2.6	4
BW 150-2	0	1	2.6	2
BW 150-3	0	1	2.4	2
BW 153-1	0	1	1.0	4
BW 156-2	.1	1	.8	5
BW 157-1	.1	1	.8	5
BW 158-2	1.4	1	.6	5
BW 158-4	1.2	2	.8	5
BW 158-5	1.7	3	.0	5
BW 159-1	1.5	3	2.4	2
BW 159-2	1.1	3	.6	4
BW 159-3	.9	2	1.4	3
BW 159-4	.6	2	2.2	2
BW 159-5	.8	1	1.8	2
BW 161-2	1.1	2	.6	5
BW 161-3	.1	1	1.0	5
BW 161-4	.4	1	.4	5
BW 162-1	.4	1	1.0	5
BW 166-1	.6	1	1.6	4
BW 168-1	.0	1	1.6	3
Irish Cobbler	7.8	5	8.8	5

^{1/} Hopperburn classes: 1, none; 2, trace; 3, light; 4, medium; 5, heavy.

^{2/} Late blight classes: 1, no lesions; 2, occasional lesion; 3, one-half leaves infected; 4, nearly all leaves infected; 5, plants dead.

Ohio table 2. Leafhopper, flea beetle, and late blight resistance in species hybrids provided by Dr. Hougas, Wooster, Ohio, 1957.

Species hybrids	Nymphs per leaf	Hopper- burn ^{1/}	Flea Beetle	Late blight ^{2/}
			Holes per leaflet	
WRF 10.1	2.3	2	.7	1
WRF 33.1	.8	2	.7	1
WRF 35.1	.3	2	.6	1
WRF 80.1	.6	1	.2	1
WRF 98.3	.1	1.5	.9	1
WRF 106.1	1.7	1.5	.4	1
WRF 125.1	3.1	2.0	.3	1
WRF 200.3	1.0	1.5	.6	1
WRF 202.5	.3	1.5	.7	1
PI 194665	.5	3	1.4	1
PI 194666	.5	3	3.9	1
PI 194672	.1	2	.6	1
PI 194678	.7	3	2.7	1
PI 194679	.4	1.5	1.8	1
PI 194681	.8	2	.4	1
PI 194684	.2	2.5	3.7	1
PI 194686	.5	3	6.1	1
Irish Cobbler	6.9	5	10.9	5

^{1/} See footnote Ohio table 1.

^{2/} See footnote Ohio table 1.

Ohio table 3. Leafhopper, flea beetle, and late blight resistance in species hybrids provided by Dr. Buck, Wooster, Ohio, 1957.

Species hybrids	Nymphs per leaf	Hopper burn ^{1/}	Flea Beetle	Late blight ^{2/}
			Holes per leaflet	
BW 171	4.2	4	6.4	5
BW 173	.9	1	11.4	2
BW 174	2.7	3	12.4	5
BW 181	1.6	1	3.4	5
BW 182	2.6	3	7.2	4
BW 194	1.0	2	29.8	1
BW 197	.2	1	6.2	4
BW 209	3.0	2	3.6	5
BW 210	.5	1	1.0	5
WRF 398.3	2.0	2	1.0	1
WRF 398.6	1.1	1	.8	2
WRF 452.1	2.3	3	.2	2
WRF 459.1	.7	2	9.6	1
WRF 461.3	1.3	2	7.2	2
S 1900	2.8	4	2.2	1
S 3032	1.4	2	4.4	1
S 3035	2.4	4	4.6	5
Irish Cobbler	9.2	5	9.8	5

^{1/} See footnote Ohio table 1.

^{2/} See footnote Ohio table 1.

Ohio table 4. Scab resistance in various seedlings grown on muck soil, Celeryville, Ohio, 1957.

Variety or seedling	Yield per acre	Tubers exam- ined	Classes of surface area covered ^{1/}					
			1	2	3	4	5	6
	Bu.	No.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Onaway	944	270	68	17	11	3	1	0
Antigo	648	132	94	5	1	0	0	0
Russet Sebago	869	110	65	18	12	3	2	0
Tawa	621	266	33	18	28	17	3	1
Saco	1040	104	44	29	24	3	0	0
Jeffers	779	123	67	27	4	2	0	0
Katahdin	987	408	12	14	42	26	4	2
Mich. 139-9	811	263	78	18	42	2	0	0
Ia. 1354	1070	49	4	22	38	24	8	4
Wis. 1429	711	134	60	20	19	1	0	0
Wis. x 137.52	796	114	68	25	5	2	0	0
Wis. x 143.52	1026	108	53	31	8	7	1	0
Ia. 801-10	616	41	5	5	41	29	20	0
Ia. 803-1	717	93	28	26	31	11	4	0
Ia. 912-6	766	104	56	33	10	1	0	0
Ia. 913-2	818	109	54	21	23	2	0	0
Ia. 911-2	379	170	69	19	10	1	1	0
Ia. 911-7	450	134	58	31	10	1	0	0
Ia. 961-1	673	148	47	30	21	2	0	0
Ia. 8140-1	876	99	31	35	33	1	0	0

^{1/} Scab classes:

- 1 = less than 1% of area covered.
- 2 = 10% of area covered.
- 3 = 30% of area covered.
- 4 = 50% of area covered.
- 5 = 70% of area covered.
- 6 = 90% of area covered.

PENNSYLVANIA

J. S. Cobb, J. D. Harrington, and E. C. Pifer

The University Farm tests were made with 50-foot single row plots, 36 in. apart, and seedpieces were spaced 9 in. apart. The plots were replicated 4 times in randomized blocks. A corn stubble was plowed down on a silt loam soil and 1800 lbs. per acre of a 5-10-10 fertilizer was applied in the row at planting time. All planting was done on May 17. The season was dry but the nights were mostly cool as shown on the temperature-rainfall, Pa. table 3. This seemed to be conducive to maturity of most of the varieties and a high dry-matter content of tubers, especially for the medium and early varieties. A very little early blight was present on a few varieties such as the Cobbler, but no late blight was found on any varieties.

A regular spraying program with parzate and D.D.T., and bordeaux, the last half of the season, was carried out.

The relative maturity time of the varieties is shown in Table 2 giving the condition of tops on Sept. 4. All tops were killed by a heavy frost on Sept. 26. Digging of early varieties was started on Sept. 19 and finished for late varieties on Oct. 1.

A few characteristics of the numbered strains might be mentioned. B926-9 seems to be about as early as Cobbler. B595-76 had green tops killed by frost on Sept. 21. The tops never attained a height of more than 12-15 in. and the yield was low. B2368-4 was a very high yielder.

The chipping quality of the tubers before any cool storage period is about as follows:

B2368-4 - poor color (2.5) rating
 B355-35 - fair color (3.0) rating
 B595-76 - med. good color (3.5) rating
 B926-9 - excellent color (4.0) rating

The test for yields in Pa. tables 4 and 5 were conducted under varying conditions in seven counties within the State.

Pa. table 1. Potato Variety Test, 1957, University Farm. Yield in cwt. per acre, percent U.S. No. 1 tubers, solids and percent total solids

Variety	Average	U.S.No.1	Total
	Yield		Solids
	Cwt.	Pct.	Pct.
<u>EARLY VARIETIES</u>			
B2368-4	162	91	19.3
B355-35	139	83	18.7
Delus	138	96	20.5
Red Bliss	134	84	21.1
Cobbler, U.S.D.A.	108	82	21.9

continued

Pa. table 1, continued

Variety	Average	U.S.No.1	Total
	Yield		Solids
	Cwt.	Pct.	Pct.
<u>EARLY VARIETIES</u>			
Cobbler, N.Y.	101	79	22.7
Plymouth, N.Y.	101	89	22.1
B595-76	100	83	20.3
Plymouth, U.S.D.A.	86	80	21.4
Cherokee, N.Y.	81	69	23.7
Chippewa	76	69	20.5
Cherokee, U.S.D.A.	73	65	24.1
Tawa	68	72	22.6
B926-9	64	68	22.2
L.S.D. for Varieties .05	17		
<u>MEDIUM VARIETIES</u>			
Kennebec, U.S.D.A.	157	90	18.4
Saco, U.S.D.A.	155	88	23.6
Teton, U.S.D.A.	151	90	17.9
Canoga, N.Y.	149	85	17.4
Pungo, U.S.D.A.	146	90	20.5
Katahdin, U.S.D.A.	143	88	17.8
Ontario, N.Y.	133	75	16.5
Katahdin, N.Y.	131	85	17.7
Kennebec, N.Y.	122	89	20.0
Katahdin, Haugh	104	80	18.0
L.S.D. for Varieties .05	18		
<u>LATE VARIETIES</u>			
Green Mountain, N.Y.	177	87	19.1
Boone, N.C.	165	90	17.3
Merrimack, U.S.D.A.	158	93	19.8
Merrimack, N.Y.	151	91	19.6
Smooth Rural, N.Y.	148	86	18.6
Russet Rural, N.Y.	143	81	18.6
Sebago, U.S.D.A.	141	91	16.4
Sebago, N.Y.	129	87	16.5
Rukat, N.Y.	115	84	19.0
Red Pontiac, Potter Co.	111	86	16.9
Rushmore, S.D.	94	84	19.1
Russet Burbank, N.Y.	77	54	19.3
L.S.D. for Varieties .05	16		

Pa. table 2. Maturity of Varieties as Expressed by Percentage of Tops dead on Sept. 4, 1957 after a planting date of May 17, 1957.

Variety	Vines Dead Pct.	Variety	Vines Dead Pct.
Red Bliss	100	Saco, U.S.D.A.	0
Cobbler, N.Y.	98	Teton, U.S.D.A.	2
Cobbler, U.S.D.A.	100	Pungo, U.S.D.A.	2
Cherokee, N.Y.	98	Ontario, N.Y.	0
Cherokee, U.S.D.A.	98	Canoga, N.Y.	2
Plymouth, N.Y.	60	Merrimack, N.Y.	0
Plymouth, U.S.D.A.	60	Merrimack, U.S.D.A.	0
Chippewa, N.Y.	50	Smooth Rural, N.Y.	0
Delus	5	Green Mt., N.Y.	2
Tawa	98	Rukat, N.Y.	5
B595-76	0	Boone, N.C.	0
B2368-4	5	Sebago, N.Y.	2
B926-9	95	Sebago, U.S.D.A.	2
B355-35	2	Russet Rural, N.Y.	0
Katahdin, N.Y.	5	Russet Burbank, N.Y.	2
Katahdin, U.S.D.A.	5	Rushmore, S.D.	20
Katahdin, Haugh	5	Red Pontiac, Potter Co.	60
Kennebec, N.Y.	30		
Kennebec, U.S.D.A.	2		

Pa. table 3. Rainfall, air and soil temperatures recorded at the potato variety experimental plots near Centre Hall, Pa., by weekly periods during the 1957 growing season.

Period	Total Rainfall Inches	Avg. Air Temp., °F		Soil Temp. °F
		Max.	Min.	
May 1-7	.01			
May 8-14	.64			
May 15-21	.89			
May 22-28	.25			
May 29-June 4	.00			
June 5-June 11	1.64			
June 12-June 18	.63			
June 19-June 25	.70			
June 26-July 2	.93			
July 3-July 9	.20	90	59	79
July 10-July 16	.76	77	50	69
July 17-July 23	1.09	91	54	70
July 24-July 30	.10	85	57	69
July 31-Aug. 6	.33	88	56	73
Aug. 7-Aug. 13	.24	85	53	70
Aug. 14-Aug. 20	.32	84	53	69
Aug. 21-Aug. 27	.16	81	50	85
Aug. 28-Sept. 3	.49	84	62	68
Sept. 4-Sept. 10	.58	77	49	70
Sept. 11-Sept. 17	1.69	78	60	64
Sept. 18-Sept. 24	.56	72	52	60
Sept. 25-Sept. 30	.00	64	37	55

Pa. table 4. Results of 1957 Pennsylvania Extension Potato Variety Demonstrations, yield of 12 varieties in 7 counties. 1/

Variety	<u>Total Yield Per Acre</u>					Schuyl-		Avg.
	Erie**	Lehigh**	Luzerne**	Potter*	kill*	Somerset**	York**	
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Boone	250	107	329	395	282	220	142	247
Saco	215	86	331	380	307	254	140	245
Red Pontiac	184	83	295	338	278	249	112	220
Merrimack	152	77	317	273	241	224	128	202
Delus	163	71	214	340	232	226	151	199
Katahdin	190	70	264	283	250	234	84	196
Russet Rural	182	38	240	351	224	225	74	191
Sebago	176	61	268	307	205	208	102	190
Plymouth	161	70	207	342	257	194	93	189
Irish Cobbler	153	70	232	285	245	194	127	187
Kennebec	152	72	241	305	223	190	125	187
Russet Burbank	130	49	263	308	218	174	100	178

U.S. No. 1 Yield (cwt. per acre)

Red Pontiac	161	200	315	233	224	94	205
Boone	212	247	233	203	174	132	200
Saco	176	205	311	197	170	84	191
Delus	143	158	289	211	119	145	178
Katahdin	146	185	218	200	173	67	165
Merrimack	118	247	134	202	185	100	164
Russet Rural	146	144	326	161	169	39	164
Sebago	131	196	260	161	158	78	164
Kennebec	114	157	278	152	141	106	158
Plymouth	131	140	284	211	99	86	158
Irish Cobbler	101	146	188	187	130	103	143
Russet Burbank	68	124	268	92	97	6	109

Single-row plots 30 feet in length with 4 replications.

Seedpieces planted 9 inches apart in the row.

*Planted 32 inches between rows.

**Planted 34 inches between rows.

1/ This information was prepared by the Extension section of Agronomy, Agricultural Economics, Entomology and Plant Pathology in cooperation with the Agronomy Staff of the Agricultural Experiment Station.

Pa. table 5. Specific gravity results in percentage of total solids of potato varieties, 1957 Pennsylvania Extension Potato Variety Demonstrations.

<u>Location</u>			
<u>Erie County</u>	<u>Lehigh County</u>	<u>Luzerne County</u>	<u>Potter County</u>
<u>D.M.</u> Pct.	<u>D.M.</u> Pct.	<u>D.M.</u> Pct.	<u>D.M.</u> Pct.
Delus 21.1	19.4	20.3	24.3
Merrimack 20.9	18.7	19.0	23.0
Saco 20.8	19.4	18.7	24.6
Irish Cobbler 19.9	18.3	19.1	22.6
Russet Rural 19.7	16.1	17.2	21.5
Katahdin 18.9	15.0	17.1	22.5
Plymouth 18.8	19.4	19.0	22.1
Russet Burbark 18.7	19.2	18.8	21.7
Kennebec 18.3	17.8	18.0	22.6
Boone 17.6	15.1	15.0	20.5
Sebago 17.6	14.4	16.6	20.6
Red Pontiac 16.0	14.8	15.1	21.2
Tawa			21.5

<u>Schuylkill County</u>	<u>Somerset County</u>	<u>York County</u>
<u>D.M.</u> Pct.	<u>D.M.</u> Pct.	<u>D.M.</u> Pct.
Delus 21.3	21.5	20.7
Merrimack 22.6	20.2	19.6
Saco 20.1	21.5	19.2
Irish Cobbler 18.4	19.9	18.4
Russet Rural 19.1	20.4	16.5
Katahdin 20.0	19.7	17.6
Plymouth 18.9	19.8	19.6
Russet Burbank 19.6	19.7	17.9
Kennebec 18.7	20.4	17.9
Boone 18.5	17.4	16.0
Sebago 18.1	18.7	17.9
Red Pontiac 16.9	18.3	15.3

Specific Gravity is the best measure of starch and dry matter in potatoes. The method used for determining specific gravity is to weigh a few pounds of tubers out of water and in water. The relation between their weight and the weight of an equal volume of water is the specific gravity of the tubers. The higher the specific gravity of a tuber, the mealier it will cook.

Tubers high in specific gravity are best for baking, because they give a mealy product. Tubers having medium to low specific gravity are best adapted for boiling or frying. The specific gravity varies with growing conditions as well as with variety.

PENNSYLVANIA
Paul Grun and Dolores McHugh

Nature of the reproductive isolations among diploid species of Solanum

Work described in last year's report was continued and expanded to increase data showing inter-crossability of species from different sections of the genus as compared with within-section crossings. Approximately 2000 more crosses were attempted and records kept as described last year. Germination tests of seed set in the 1956 season were run and hybrids raised to maturity, when possible, to verify their hybrid nature. A start has been made at analysis of hybrid fertility as reflected in percent stainable pollen.

A technique was developed for determining percent germination of pollen to be used in evaluating whether failure of pollen germination is part of the mechanism isolating species. This consists of putting pollen on stigmata followed two hours later by fixation in 45% propionic acid. The stigma tips are then smeared in propiono-carmin. As high as 90 percent germination of pollen has been found in some cases by use of this technique.

Germination tests of seed of approximately 300 interspecific combinations were run using 50 seeds per sample. Preliminary results of tests comparing germination of seed of crosses of species within the sections Tuberosa and Commersoniana with between-section crossings indicate the presence at this level also of a partial isolating barrier, but in this case operative only in one direction. Commersoniana x Commersoniana seed germinates more readily than does Commersoniana x Tuberosa seed. Tuberosa x Tuberosa seed, however, does not have a higher percent germination than does seed of intersectional crosses. A barrier of this type would be effective in keeping Tuberosa section genes out of the section Commersoniana, but not vice-versa. These germination tests are being repeated.

Morphology of hybrids was generally intermediate to the parents, and confirmed their hybrid nature. Of the three combinations listed in last year's report as polyadenium hybrids two (x Rybinii and x gibberulosum) were morphologically inseparable from normal polyadenium. Since the crossings followed bud emasculation and were isolated from insect vectors, the non-hybrid nature of progenies suggests the presence of cleistogamy or apomixis in S. polyadenium. Plants of the combination polyadenium x macolae are still of questionable identity and will be subject to further observation and test.

A type of crossing barrier that has not been found to be operating among the other diploid species tested separates S. verrucosum from species of the sections Commersoniana and Tuberosa. In tests of S. verrucosum x species of either of these sections there is a very low set of berries per cross attempted when verrucosum is the pollen parent. The reciprocal crosses, however, reveal no barrier at all. That this is a real barrier and not just a reflection of pollen sterility is shown by the fact that verrucosum pollen is completely effective on verrucosum stigmata.

PENNSYLVANIA
W. R. Mills

Test plots in 1957 were conducted in three locations: Lehigh County, the principal table-stock county in the southeast; Potter County, the principal seed county in the north; and on the University farm in Centre County.

Pennsylvania, like much of the East, suffered a severe drought, being most severe in the southern part of the state. The Lehigh plot was planted May 11 in very dry soil. Subsequent rainfall was as follows: May, 1.6 inches; June, 2.4; July 1.2, and August 1.6. Practically all varieties were dead when harvested September 5. At University Park, the rainfall was lowest in the history of the weather bureau. However, the distribution was such that a surprisingly good crop of high quality potatoes was obtained. Potter County had too much rain in June and early July resulting in water damage to one end of the plot. Subsequently, rainfall was very light, resulting in a heavy set of smallish tubers.

Thirty-six unnamed selections, plus 8 named varieties were grown in the three plots. Yields in Lehigh County were so low as to be practically meaningless. At University Park, Katahdin, the standard check variety, averaged 411 bushels per acre, with 27 of the 44 varieties equaling or exceeding Katahdin in yield. Eight of the varieties exceeded 500 bushels per acre, the highest yield being 582. Yields were somewhat lower in Potter County.

Samples for determination of solids and chipping quality were taken from the three locations. Results of these tests showed that while tubers from the Lehigh plot averaged about 2% lower in solids than for University Park and Potter, the relative ratings were similar in the three locations. Also, those varieties from Potter and University Park which made good chips were nearly as satisfactory as those from Lehigh.

Of the 36 unnamed varieties in yield trials in 1957, 13 will be repeated in 1958. Four of these varieties in small tests last winter showed promise of curing out after being in cold storage. This year reconditioning tests are being conducted with larger samples.

Other phases of the program included the planting of about 18,000 seeds in the greenhouse, screening the small seedlings with a mixture of races 1, 4 and 2, 4 of Phytophthora infestans and growing of about 7,000 screened seedlings in the field. From the 7,000, 425 seedlings were selected for further blight and virus tests and for 10-hill increase in 1958. From about 300 10-hill lots grown in 1957, 36 were retained for 50-hill plots in each of the regions.

Blight Resistance

In 1956, a large number of clones originating with Dr. R. W. Hougas of The Potato Introduction Station, Sturgeon Bay, Wisconsin, were tested for blight resistance in Mexico. A summary of results is given in the report of the National Potato-Breeding Program for 1956. About 50 of the most resistant selections were obtained from Dr. Hougas for further breeding. Of these 50

selections, 22 were F_1 s of Solanum demissum x diploid spp.; 7 were S. demissum x diploid sp. x Katahdin and 21 were S. demissum x diploid sp. x S. stoloniferum.

Tubers of several of these failed to grow and plants of several others either failed to flower or flowered too late to be used. Pollinations with S. tuberosum pollen were made on 38 selections, 21 of which set seeds. Seeds were set only on F_1 selections and F_1 x Katahdin. No seeds were obtained from pollinations of F_1 x S. stoloniferum flowers, although in several instances, small parthenocarpic berries were set. Additional attempts will be made to obtain seeds with the S. stoloniferum hybrids.

The purpose of going back to this material is to attempt to maintain the high degree of "field resistance" along with the major R. genes, in future breeding. The difficulty is in obtaining for testing purposes the correct physiological races, which in turn must have a high degree of virulence. Virulence, (aggressiveness, pathogenicity) is not a simple character. We have over a period of years, selected several hundred seedlings which exhibited very high resistance to races available here. When tested in Mexico, the resistance is invariably much less or nil. In greenhouse tests of large numbers of seedlings, we have rather frequently encountered a type of cross resistance and susceptibility involving "minor genes." For example, seedling 5EL-5 (major genes $R_1 R_2$) was rated 4 (on a scale 0-5, with 5 representing complete susceptibility) with race 1, 2, 4 but only 2 (necrotic flecks plus a few slowly spreading lesions) with race 1, 2, 3. Seedling 5HJ-5 (R_2) received a rating of 3 with a newly isolated, highly pathogenic race 2, 4, but was rated 5 with race 1, 2, 4. This particular culture of race 1, 2, 4 appears to possess a wide spectrum of pathogenicity factors for minor genes. That it is not wide enough is demonstrated by the fact that 60 clones, possessing major genes R_1 , R_2 or $R_1 R_2$, selected for high resistance (ratings of 1 to 3) to this culture were all susceptible (4 or 5) in Mexico.

That there are "minor genes" which will stand up is proved by the moderate degree of resistance found in such old varieties as President, Hindenburg, Achersegen, etc. Recently higher degrees of stable resistance have been demonstrated by Neiderhauser and co-workers in Mexico. In areas, such as Pennsylvania, where one must depend upon greenhouse screening, the problem is to find physiological races which will effectively screen not only the major, but also the minor genes.

RHODE ISLAND
J. E. Sheehan

Yield trials of 20 potato varieties were conducted in Rhode Island at the Agricultural Experiment Station at Kingston in 1957. Seed stock of all 20 varieties used in the test was obtained from U.S.D.A. sources at Presque Isle, Maine. The potatoes followed three years of grass-legume hay culture on Bridgehampton silt loam.

Yields were calculated on the basis of 32-foot rows. Seed pieces were spaced 12 inches apart in the row with 36-inch spacing between rows. Each variety had four replicates.

All varieties were planted on April 22 and harvested September 19. A chemical vine killer was applied on September 13. The only varieties still active at this time were Sebago and Ontario.

The spring and summer of 1957 went down as one of the driest on record in Rhode Island. Rainfall from April through September was only 14.22 inches. This is 9.27 inches below normal. Due to the extremely dry conditions it was decided that irrigation would be necessary for protection of the crop. The potatoes were subsequently irrigated twice with an overhead sprinkler system applying one inch of water each time. The first irrigation was applied on June 19 and the second on July 8.

R. I. table 1 gives yield and other data from the 20 varieties. Ontario was the highest yielding variety with 371 hundred weight per acre, significantly higher than all other varieties except Boone. This was the first year Boone was included in the trials and although its dry matter content was not as high as some of the other newer varieties it looks to be a promising selection.

The Russett Burbank variety produced the highest dry matter content 20.6% followed by Green Mountain and Delus 20.1%. Ontario and Merrimack were next with 19.9%. Pontiac had the lowest dry matter content, only 16.9%. The red-colored seedling B2368-4 appears to be a more suitable potato for this region than the Pontiac. Included in the trials three years B2368-4 has not quite equaled Pontiac in yield but has each year been considerably higher in dry matter content. It also appears to hold its red color in storage slightly better than Pontiac.

Insect and disease damage was negligible this year. The flea beetle infestation was light and readily controlled with one-half pound of Dieltrin in 100 gallons of water per acre. Two applications were made, June 3 and July 10. One application of fungicide for late blight protection was applied (July 24) along with two pounds of 50W DDT to control leaf hoppers. Some corn borer injury was noted but the borer population was much less than in 1956 when practically every vine had at least one corn borer hole.

A gallon of 90% sodium arsenite in 100 gallons of water per acre was used to kill green vines and weeds before digging.

R. I. table 1. Yield and other data for 20 potato varieties grown at Kingston, R. I. 1957

Variety	Yield/Acre		Dry	Days to	Size	Skin &	Shape
	U. S. No.1		Matter	Maturity			
	Cwt.	Pct.	Pct.				
Ontario	371	94	19.9	145+	med. large	smooth	regular
Boone	333	98	18.7	142	very large	smooth	regular
Sebago	322	97	18.9	145+	large	smooth	regular
Saco	316	97	19.5	134	medium	smooth	knobby irreg.
Chippewa	315	97	18.1	134	large	smooth	regular
Pontiac	313	97	16.9	134	large	rough	regular
B2368-4	307	98	19.0	134	very large	smooth	irregular
Green Mountain	307	97	20.1	142	large	rough	irregular
Katahdin	282	99	18.9	142	large	smooth	regular
Mohawk	272	99	19.8	134	large	rough	regular
Kennebec	268	98	17.9	142	large	smooth	regular
Menominee	262	97	19.0	145	med. large	rough	irregular
Russett Burbank	254	90	20.6	142	large	rough	irregular
Russett Rural	237	94	19.0	140	med. small	rough	knobby irreg.
Delus	219	97	20.1	135	med. large	rough	regular
Plymouth	212	96	18.7	131	large	rough	regular
Cherokee	208	96	19.0	123	med. large	smooth	irregular
Irish Cobbler	200	94	19.5	102	medium	smooth	regular
Merrimack	200	97	19.9	138	med. large	rough	irregular
Warba	172	95	18.4	116	small	smooth	regular
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SOUTH CAROLINA

W. M. Epps, W. C. Barnes, and R. L. Addison

Potato Variety Trial

Objective: The evaluation of new potato varieties and seedlings for adaptability to South Carolina conditions.

Methods: Planted, February 4, 1957, Field A-2; fertilizer, 1,650 pounds per acre of 6-8-6; plot plan, randomized block, 5 replicates, plots single row 36 feet 4 inches long (1/400 acre); harvested, June 3, 1957; records, 1 ten-pound sample was taken from each plot at harvest. Dry matter was determined by weighing the sample in water and in air and converting the specific gravity obtained to dry matter.

Chip yields were obtained by cooking a 200-gram sample of sliced potatoes and weighing the chips resulting. All samples were cooked until bubbling stopped. Chip color was graded on a scale varying from 20 (chocolate brown) to 90 (very light cream). A figure above 70 is considered acceptable and 80 is optimum. The blackening index was obtained by exposing the freshly cut raw tubers for 3 hours at summer room temperature. The degree of blackening varied from 1 - no darkening to 5 - very dark.

Conditions: Stands and growth in general were good. Disease was not a factor except for some tuber rot at harvest.

Results: Tabular data are presented in South Carolina table 1. Observational data are given below.

Bliss Triumph - round, red, medium size, deep eyes, white flesh, no internal browning.

B 69-16 - oval, white, medium to large size, shallow eyes, smooth attractive, flesh appeared "watersoaked" with a trace of internal browning, trace of tuber rot.

Sebago (Prince Edward Island) - long oval, white, medium to large size, eyes shallow, smooth attractive, trace of internal browning.

Sebago (Maine) - long oval, white, medium to large size, eyes shallow, smooth, attractive, trace of internal browning.

Tawa - round, flattened, white, medium to large size, eyes shallow, smooth attractive, 1 tuber with slight trace of internal browning.

Canso - oval round, white, medium to small size, high percentage of size B's, eyes shallow, smooth attractive, flesh white, no internal browning.

Delus - oval round, white, medium to large size, eyes shallow, smooth attractive, flesh white, no internal browning, tuber rot so severe that over half of the tubers were rotten at harvest.

B 73-3 - oval, white, medium size, eyes shallow, smooth attractive, flesh white, no internal browning, trace of tuber rot in the field.

B 605-10 - oval round, white, medium size, eyes medium in depth, appearance only fair, slightly rough and irregular, flesh white, no internal browning. One of 25 tubers had hollow heart.

B 3427-7 - round, white or slightly russeted, small size, many size B's, flesh white, no internal browning.

B 3428-20 - round oval, white, small size, many size B's, smooth and shallow eyed, flesh white, no internal browning.

B 3428-41 - round, white, medium to small size, eyes shallow, smooth and attractive, flesh white with no internal discoloration.

South Carolina table 1. Potato variety trial, Charleston, S. C., 1957.

Variety	Yield per acre Cwt.	Dry matter Pct.	Chip yield Pct.	Chip color ^{1/}	Blackening ^{2/} index
Bliss Triumph	208.0	16.97	29.04	60	3.6
B 69-16	272.0	17.62	30.23	22	2.0
Sebago PEI	225.6	17.49	31.89	76	2.0
Sebago Maine	216.0	17.87	32.17	79	2.0
Tawa	218.4	17.53	30.29	80	1.8
Canso	183.2	18.47	32.47	71	3.0
Delus	81.6	19.35	32.40	77	3.0
B 73-3	188.8	18.79	30.30	79	2.2
B 605-10	216.8	18.32	30.16	26	1.2
B 3427-7	194.4	16.83	29.88	58	1.4
B 3428-20	168.0	17.30	30.03	80	1.4
B 3428-41	157.6	17.52	31.27	86	1.8
L.S.D. .05 level	37.9	0.78	1.42	6.9	0.80
L.S.D. .01 level	50.7	1.04	1.90	9.2	1.07

^{1/} Chip color - 20 (chocolate brown) to 90 (very light cream) with 80 the optimum golden-tan color.

^{2/} Blackening index - 1 (no darkening) to 5 (very dark).

Conclusions and Summary: The following varieties are considered unworthy of further trial for reasons as listed:

B 69-16 - unsuitable for chips

Delus - rotted badly in field

B 605-10 - unsuitable for chips

B 3427-7 - unsuitable for chips, tubers too small

Canso, B 3428-20 and B 3428-41 were satisfactory in all respects except for relatively small tubers. They should be retested and planted at 12-inch spacing instead of 9 - 10-inch as used in this test.

Tawa and B 73-3 appeared satisfactory in all respects. Tawa should be retested on a slightly larger scale and B 73-3, which has looked good over a period of several years, should be increased for large scale grower trials.

TEXAS (Prairie View)

J. M. Coruthers

During the month of February, 1957, twenty-one varieties were planted at Substation 18 to test for yield and market qualities. Planting was accomplished in good time, but the season turned out to be very wet. However, some drainage was effected by having rows on beds and ditches across the ends to carry away surplus water. There was much variation in yields of varieties under growing conditions of too much water most of the time. Highest yields of marketable potatoes were made by Mohawk, Boone, Merrimack, Pungo, Kennebec, and Marygold. Data concerning the experiment are as follows: location, Prairie View, Texas; soil, Hockley Fine Sandy Loam; plot size, 30 feet x 38 inches; plot design, randomized block; seed source, supplied by Mr. Robert V. Akeley, Horticultural Crops Research Branch, U.S.D.A., and Dr. T. P. Dykstra, Louisiana State University, Baton Rouge, Louisiana.

Planting date, February 15, 1957; harvest date, June 1, 1957; insecticide, 10 percent D.D.T.; fertilizers, 600 pounds 5-10-10 per acre applied in bed.

Coruthers table 1 shows yield for the varieties.

Coruthers table 1. Average yield per acre by varieties, Prairie View, Texas, 1957.^{1/}

Variety	Yield per acre				Variety	Yield per acre			
	U.S.	U.S.	Culls	Total		U.S.	U.S.	Culls	Total
	No.1	No.2				No.1	No.2		
	Bu	Bu	Bu	Bu		Bu	Bu	Bu	Bu
G. Mountain	80.2	62.1	25.2	167.5	Red Pontiac	77.8	62.3	29.2	169.3
White Rose	85.4	55.3	41.1	181.8	Kennebec	100.3	55.6	18.9	174.8
I. Cobbler	90.5	53.5	5.5	149.5	Teton	68.8	44.9	24.8	138.5
Marygold	110.4	37.6	13.4	161.4	Boone	104.1	71.4	19.3	194.8
Saco	65.3	63.0	6.9	135.2	Plymouth	90.1	49.9	19.5	159.5
Delus	49.3	32.8	16.2	98.3	Merrimack	87.8	80.4	17.7	6.0
Triumph	49.9	66.9	30.9	147.7	Cherokee	55.6	53.7	19.9	129.1
Pungo	107.3	52.7	12.8	172.8	B 605-10	94.6	52.9	14.1	162.0
Katahdin	69.3	51.8	15.7	136.8	Red LaSoda	80.5	55.5	11.0	147.6
Mohawk	126.2	66.9	2.6	195.6					
Early Gem	49.1	41.4	13.6	104.1	L.S.D. .05				15.0
Chippewa	67.4	46.6	14.5	128.6	.01				21.0

^{1/} 30-foot rows, 38 inches apart, planted 12 inches apart in row. 600 lbs. 5-10-10 fertilizer per acre applied in bed.

TEXAS (Brownsville)
H. M. Meyer

For many years the potato was considered one of the main vegetable crops in the lower Rio Grande Valley and Triumph, an early-maturing red sort, the most desirable variety. The susceptibility of Triumph to late blight and scab and the increase in acreage of other potato-growing areas in the South has nearly eliminated potato production in this valley. An effort is being made to re-establish the potato as a vegetable crop in this area.

In 1956 a number of red selections were grown near Brownsville, Texas for observation. The outstanding red selection (B 2368-4) that year and 23 others were tested in a replicated trial in 1957 (Meyer table 1). The material was supplied by R. V. Akeley, Beltsville, Maryland, and W. G. Hoyman, Fargo, N. D.

Saco was the first variety to germinate, followed closely by Sebago, Chippewa, B 926-9 and B 2368-4. Varieties with-standing the wind were B 2368-4, Sebago, Merrimack, N.D. 2774-2R, Red LaSoda, Red Pontiac and Boone. Ninety percent of the tubers of ND 457-1-16 were severely infected with scab; Red LaSoda and Red Pontiac seriously infected; and Chippewa, Katahdin, Kennebec and Cobbler were mildly infected. The late blight ratings are shown in Meyer table 1.

Seedlings that were grown for observation are listed in Meyer table 2. Selections showing wind resistance were B 3309-2, B 3897-4, B 3897-11, B3903-1, OB 2905-1, B 1339-12, B 2938-22, and B 3454-5. The better selections free from late blight were B 3309-2, B 3309-4, B 3897-11, OB 2905-1, B 1339-12, B 3095-18 and B 3454-5. Seedlings that were free from scab at harvest time were B 3309-2, B 3897-11, B 3903-1 and B 3554. Seedlings B 3309-2 and B 3897-11 were superior in most respects to all other entries and should be increased and tested for commercial purposes.

Insects affecting the crop were cabbage loopers, cabbage leaf worms, corn-ear worms, and several species of leaf hoppers. Very little disease was observed in the plants except for a slight (light) late blight infection and some evidence of curly top.

Meyer table 1. Variety and seedlings yield test planted at Primera, Texas 1957.^{1/}

Variety or Seedling	Yield per acre		Wind ^{3/} Resistance	Late Blight Rating
	Average	C rep. ^{2/}		
	Cwt.	Cwt.		
Boone	113	118	1	
Chippewa	126	141	2	
Delus	82	87		None
Early Gem	44	48	3	
Irish Cobbler	97	103		None
Katahdin	110	126	2	
Kennebec	109	119	2	Trace

continued

Meyer table 1, continued.

Variety or Seedling	Yield per acre		Wind ^{3/} Resistance	Late Blight Rating
	Average	C rep. ^{2/}		
	Cwt.	Cwt.		
Merrimack	111	119	1	None
Plymouth	100	115	2	None
Saco	91	105	3	
Sebago	138	143	1	None
B 137-5	73	93		
B 605-10	87	98		None
B 607-56	76	96		None
B 751-119	63	86		None
B 859-10	100	111	2	None
B 926-9	100	105	3	
B 2187-25	72	76		
B 2368-4	110	129	1	
ND 457-1-6	79	94		
ND 7774-3R	89	98		
ND 2609-R	87	93	3	
Red LaSoda	140	143	1	Medium
Red Pontiac	129	152	1	Medium

^{1/} Plots of 1 row 45 feet long with 4 replications. Spacing between seed-pieces was 15 inches and 42 inches between rows with 6-foot alley between replications. Total fertilizer used per acre equalled 130 pounds of nitrogen and 100 pounds of phosphate. Seed was stored, cut and suberized in a garage the 1st of June, planted June 21 and harvested April 18. Insects controlled by periodic dustings with DDT and parathione. No fungicide used.

^{2/} C replication was allowed to grow 8 days after the first harvest.

^{3/} 1= with-stood repeated wind velocities up to 35 miles-per-hour.

2= Damaged badly but recovered.

3= Damaged badly and never recovered.

Meyer table 2. Seedling observation test.^{1/} Planted at Primera, Texas, 1957.

Selection	Skin Color	Disease Resistance	Selection	Skin Disease	
				Color	Resistance
B 3309-2	Red	Lb,Sc.	B 3400-1	Wh	L2
B 3309-4	Red	Lb,Sc.	B 2162-1	Red	Sc.
B 3897-4	.	Sc.			
B 3897-11	Red	Sc.	B 2368-13	Red	Lb.Sc.
B 3903-1	Red	Sc.	B 3874-4	Red	" "
OB 2905-1	Wh	H. burn	B 2922-26	Red	" "
B 1339-2	Wh	L2	B 3140-36	Red	X,V.Wilt
B 2971-14	Wh	"	B 3319-30	Wh	" "

continued

Meyer table 2. Seedling observation test, planted at Primera, Texas, 1957.^{1/}

Selection	Skin Color	Disease Resistance	Selection	Skin Color	Disease Resistance
B 2938-22	Wh	L2	B 3427-7	Wh	Lb, X, A, V. wilt
B 3095-18	Wh	"	B 3428-20	Red	Lb, X, A, V. wilt
B 3299-13	Wh	"	B 3428-41	Red	Lb, X, A
B 3391-2	Wh	"	B 3453-2	Red	Sc, A
B 3397-17	Wh	"	B 3454-5	Red	Sc. A
			B 3454-14	Red	Sc

^{1/} Five-pound samples were planted under similar conditions to those presented in Meyer table 1.

TEXAS (Laredo)
B. A. Perry

Of the 12 varieties indicated in the replicated test at Laredo (Perry table 1), B2368-4 seems to be the outstanding entry. This red selection was about equal to Sebago in yield and did not show any scab infection. From a quality view-point Katahdin and Plymouth were the best. Plymouth was far superior to Early Gem as a commercial-russet sort in this test.

In the observational trials (Perry, table 2), B3454-5 was considered the most desirable entry and further testing is recommended. Although it is late in maturity, it has scab resistance and a smooth red-tuber that is very attractive.

Observations indicate a certain amount of silver scurf present in some of the selections. If this disease is largely transmitted by seed-tubers, then lines showing silver scurf at their origin might as well be discarded.

Perry table 1. Potato variety and trial test, Laredo, Texas, 1957.^{1/}

Variety ^{2/}	Yield of U.S. No.1 100# Bags per Acre ^{3/}			Remarks ^{4/}	
	A	B	Total	Maturity ^{5/}	Scab infection ^{6/}
Boone	73.4	9.4	82.8	VL	L
Chippewa	118.9	14.5	133.4	VE	N
Delus	97.0	8.5	105.5	L	L
Early Gem	74.6	9.1	83.7	ME	VL
Katahdin	139.5	7.2	146.7	ML	VL
Kennebec	130.4	4.9	135.3	ME	L
Merrimack	99.8	9.2	109.0	L	L
Plymouth	128.9	4.1	133.0	ME	VL
Saco	97.5	9.6	107.1	VE	N
Sebago	157.4	7.0	164.4	M	VL
B 605-10	125.8	4.1	129.9	E	L
B 2368-4	150.6	6.1	156.7	ME	N
L. S. D. at 5%	25.2	3.3			
L. S. D. at 1%	33.7	4.4			

^{1/} Test planted on the Bartlett Farm, located in Zapata County, 25 miles south of Laredo, planted June 20 and harvested May 7, 1956.

^{2/} Seed potatoes supplied by R. V. Akeley, U.S.D.A., Beltsville, Maryland.

^{3/} Averages of 5 replications.

^{4/} Growth cracks moderate in Early Gem and light in Boone and B 605-10; none observed in other varieties.

^{5/} Maturity - VL = very late; VE = very early; L = late; ME = medium early; ML = medium late; M = medium; E = early.

^{6/} Scab infection - L = light; N = none; VL = very light.

Perry table 2. Potato variety and breeding test, Laredo, Texas, 1957.^{1/}

Variety	Observational Lines Yield of U.S.No.1 tubers		Notes On yield, quality and disease of tubers
	A	B	
	Lb.	Lb.	
B 3400-1	12.0	1.3	Poor yield; no scab
B 926-9	20.8	0.9	Good, smooth, very mild scab
B 2938-22	----	---	Poor yield; smooth, mod. scab
B 3435-2	----	---	Rough, poor shape, scab
B 607-56	----	---	Growth cracks; immature
B 3454-5	32.5	6.5	Sl. late; smooth, no scab
B 2187-25	19.2	4.6	High proportion small size
B 3319-30	----	---	Very few, small potatoes
B 3427-7	----	---	Poor shapes; mod. scab; discard
B 3428-41	----	---	Poor size; mostly small, light scab
B 751-119	----	---	Poor size; mostly small, light scab
B 859-10	----	---	Poor yield; small size; mod. scab
B 3397-17	29.0	2.3	Late; smooth, mod. scab
B 2971-14	20.1	3.4	Small size; attractive, no scab
B 2922-26	----	---	Poor yield; mod. scab
B 1339-12	14.0	5.1	Poor yield; mod. scab
B 2162-36	5.1	12.4	Poor yield; small sizes; no scab
B 2368-13	28.5	1.3	Fair yield, mod. scab
B 2874-4	----	---	Pale color; poor shapes
B 3299-13	24.2	1.0	Good smooth pot; no scab
B 3095-18	17.6	1.3	Poor yield; attractive; no scab
ND 2774-3R	----	---	Heavy silver scurf; growth cracks rusty-red
Red Pontiac	43.0	1.1	Heavy scab and scurf
ND 2906-1R	----	---	Heavy scab and scurf
Red LaSoda	31.7	0.5	Mild silver scurf

^{1/} Test planted on the Bartlett Farm, located in Zapata County. 25 miles south of Laredo. Planted January 20, and harvested May 7, 1957.

VIRGINIA
Flood S. Andrews

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The Productive Capacity and Merits of Virginia-Grown Seed Potatoes

Potato seed source studies are being conducted by the Department of Horticulture, Blacksburg, Va., in cooperation with the Virginia Truck Experiment Station and the Florida Agricultural Experiment Station at Hastings and Fort Pierce, Florida.

The purpose of the experiment is to evaluate the merits of Virginia grown seed potatoes and productive capacity when grown at Blacksburg and Norfolk, Va., and at Fort Pierce and Hastings, Fla., and to determine whether high quality relatively disease-free, high-yielding seed potatoes can be successfully grown in certain areas of Virginia.

Seed potatoes of 5 varieties grown in Maine and the same 5 varieties grown at Blacksburg, Va., were held in storage at 40° F. from harvest in August until planting time. Subsequently 5 varieties from the 2 seed sources were tested for yield and the presence of diseases at Blacksburg, Va. Three varieties were tested at Norfolk, Va., and 3 were tested at Fort Pierce and Hastings, Fla. All test plots were randomized and replicated 4 or 5 times. At harvest yield was recorded in the number of 100-pound bags per acre.

The average yield data are summarized in Andrews table 1. There was no significant difference in yield between seed sources at any location. At Blacksburg, Va., all varieties produced higher yields than at other locations. There was a marked difference in yield between varieties. Pontiac produced the highest yields at Blacksburg in 1957 and Cobbler the lowest yield. At Norfolk, Va., Cobbler produced a higher yield than Sebago or Kennebec. At Hastings and at Fort Pierce, Fla., the average yield of Pontiac was slightly higher than that of Sebago and the yield of Sebago was higher than the yield of Kennebec.

Andrews table 1. Influence of seed source, variety, and location on yield of potatoes, 1957.

Variety	Source	Yield of U.S. No. 1 tubers			
		Blacksburg,	Norfolk,	Fort Pierce,	Hastings,
		Va.	Va.	Fla.	Fla.
		Cwt.	Cwt.	Cwt.	Cwt.
Cobbler	Virginia	314.7	126.1	-	-
Cobbler	Maine	280.2	148.1	-	-
Sebago	Virginia	317.7	85.9	156.8	234.8
Sebago	Maine	317.6	84.2	165.9	199.5
Kennebec	Virginia	346.6	121.1	153.7	187.4
Kennebec	Maine	317.1	109.5	158.0	183.0
Pontiac	Virginia	407.3	-	185.6	226.6
Pontiac	Maine	377.6	-	183.4	280.1
Katahdin	Virginia	317.6	-	-	-
Katahdin	Maine	305.5	-	-	-

There was no evidence of disease at any location higher than the tolerance for certified seed. When grown at Blacksburg, Va., Cobblers from both sources of seed showed a slight infestation of leaf curl virus.

VIRGINIA (Blacksburg)
P. H. Massey, Jr.

Twelve potato varieties were grown and evaluated at the Virginia Agricultural Experiment Station in 1957. The experimental procedure and growing conditions were as follows: location, Blacksburg, Virginia; soil, Groseclose silt loam; soil pH, 5.7; previous crop, cover crop; plot size, 30 x 3 feet (data taken on center 28 feet of each record row); plot design, randomized block; replications, four; tubers, supplied by Plant Industry Station, Beltsville, Md.; spacing, twelve inches; fertilization, 1,500 pounds per acre of 5-10-5. One-half broadcast and harrowed into soil and the remainder applied in bands at time of planting. Planting date, March 26; cultivation, frequently enough to control weeds; insecticides, D.D.T. and Malathion; growing conditions, generally favorable; harvest date, September, 9.

The Pontiac and Boone varieties yielded significantly more U. S. No. 1 potatoes than Irish Cobbler, B 605-10 and B 607-56. Kennebec, Plymouth, and Saco also produced good yields under the conditions of this experiment.

The Merrimack variety was significantly higher in specific gravity than all other varieties tested except Saco, Cherokee, and Delus. This variety also had the highest specific gravity in the 1955 and 1956 trials.

Pontiac, the top ranking variety from the standpoint of yield of No. 1 potatoes was found to have the lowest specific gravity of any variety tested.

Blacksburg table 1. Yield per acre and dry matter of twelve varieties of potatoes tested in 1957.

Variety or Selection	Average Yield Per Acre				Specific Gravity ^{1/}	Total solids
	U.S. No.1	U.S. No.2	Culls	Totals		
	Cwt.	Cwt.	Cwt.	Cwt.		Pct.
Pontiac	363 ^{a2/}	17 ^{abc}	30 ^{cde}	410 ^a	1.063 ^d	16.0
Boone	330 ^{ab}	17 ^{abc}	14 ^e	361 ^{ab}	1.077 ^c	18.9
Kennebec	322 ^{abc}	12 ^{bc}	77 ^{ab}	411 ^a	1.077 ^c	18.9
Plymouth	318 ^{abc}	8 ^c	20 ^{de}	346 ^{abc}	1.075 ^c	18.7
Saco	306 ^{abc}	25 ^a	81 ^a	412 ^a	1.080 ^{abc}	19.7
Pungo	274 ^{abcd}	14 ^{bc}	24 ^{de}	312 ^{abc}	1.079 ^{bc}	19.6
Merrimack	260 ^{abcd}	13 ^{bc}	18 ^e	291 ^{bc}	1.084 ^a	20.7
Cherokee	244 ^{bcd}	19 ^b	55 ^{abc}	318 ^{abc}	1.082 ^{ab}	20.2
Delus	219 ^{bcd}	8 ^c	44 ^{cde}	271 ^{bc}	1.082 ^{ab}	20.2
Irish Cobbler	217 ^{cd}	25 ^a	50 ^{bcd}	292 ^{bc}	1.079 ^{bc}	19.6
B 605-10	215 ^{cd}	11 ^{bc}	34 ^{cde}	260 ^{bc}	1.076 ^c	18.9
B 607-56	192 ^d	15 ^{bc}	30 ^{cde}	237 ^c	1.076 ^c	18.9

^{1/} Specific gravity determinations made on four replications of 25 tubers each and converted to percentages.

^{2/} The superscripts (a, b, and c) indicate the statistical significance of the yield figures at the 5 percent level. For example, in each column, data bearing an "a" superscript are significantly different from those not having an "a"; "b" significantly different from those not having a "b", etc.

WASHINGTON (Prosser)
J. D. Menzies

1957 Scab Nursery Test

The nursery was planted in two replicates of two hills per variety on Experiment Station Field E-36. This field has produced five consecutive crops of scabby potatoes, and inoculum level is high.

The entire crop was graded for scab damage into seven scab classes from which a scab index was calculated. The index is approximately equal to the percentage of the tuber surface involved in scab lesions. Marketable potatoes are those with less than 5 percent of the tuber surface scabbed regardless of the other defects. Results are shown in Washington Table 1.

Check plots of White Rose variety grown in the same field in other experiments had an average scab index of 18.1 and only 10 percent marketable. Cherokee was not much better than White Rose, although the lesions were not so erumpent. B2874-4, with the lowest scab index, was also smooth and attractive with good yield and tuber size. It is a red potato with white flesh. The skin color may be rather light. B3903-1, while not very scab resistant, was outstanding for a very attractive red skin color. B3897-11 and B3897-4 both showed undesirable pink streaks in the flesh. Comments on some of the other seedlings are noted in the table. From the results of this test, it appears that only B2874-4 has any possibilities in scab-infested ground in this area.

Washington, table 1. Results of Uniform Scab Nursery Test, 1957.
Irrigation Experiment Station, Prosser, Washington

Variety	Scab index	Percent Marketable	Total Tubers Graded	Skin Color	Comments
B2874-4	1.8	84.2	30	R	Smooth, white flesh, good.
B2162-36	2.3	83.8	42	R	Tubers too small
B3857-11	2.4	79.3	49	W	Russet, small round
B3309-4	4.6	54.2	11	R	Pale red, white flesh
B3832-20	4.8	65.9	44	W	Attractive but small size
B3897-11	5.2	57.1	13	R	Pink flesh, purple skin
B3876-25	6.3	46.8	32	W	Very shallow scab
B3897-9	9.5	0	7	R	White flesh
B3964-1	11.3	33.4	26	W	
B3837-11	11.4	0	17	W	
B3114-52	11.4	0	17	W	
B3903-1	11.5	21.1	37	R	Attractive red skin, white flesh
B3319-30	11.8	11.0	39	W	
B3454-5	11.9	9.5	32	R	
B3897-4	12.9	4.1	20	R	Pink flesh
Cherokee	13.3	19.0	17	W	
B3871-6	14.3	33.4	18	W	
B3309-2	14.3	10.7	29	R	
B2922-26	14.5	0	16	W	
B2368-13	15.1	11.3	19	R	
B3849-10	17.0	3.4	24	W	

continued

Washington, table 1, continued

Variety	Scab index	Percent Marketable	Total Tubers Graded	Skin Color	Comments
B3627-ND	17.7	0	26	W	Very deep pitted scab
B3453-2	20.0	0	6	R	
B3172-13	22.8	0	46	W	
B3454-14	23.7	0	6	R	
LA-1859	25.8	0	18	R	

WISCONSIN
R. H. Larson and R. V. Akeley
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Physiological Internal Tuber Necrosis

Field testing for resistance to the nonparasitic internal tuber necrosis on Plainfield sand at the Hancock, Wisconsin Substation during 1957 included 3 standard potato varieties and 7 seedling varieties. The indices are presented in Wisconsin table 1.

Wisconsin table 1. Incidence of internal tuber necrosis.

Variety	Necrotic Index ^{1/}
Boone	0
Onaway	24
Ontario	48 ^{2/}
B 2874-4	1
B 2922-26	1
B 3319-30	2
B 3428-41	3
B 751-119	36
B 579-3	37
B 3454-5	42

^{1/} Index: 100 = All tubers with severe internal necrosis
0 = All tubers free of internal necrosis

^{2/} Ontario was used because of its known susceptibility

WISCONSIN

F. J. Stevenson, E. D. Jones and Charles Cunningham

Red Dot Potato-Breeding Program

The prime objective of the Red Dot potato-breeding program is the production of new varieties with higher chip quality than any that are now being used; and since the company grows about 2500 acres of potatoes, other characters such as season of maturity, yield, percentage of solids, tuber shape, depth of eye, keeping quality and resistance to the most troublesome diseases must always be emphasized. The field work is done on the Red Dot Research Farm, Rhinelander, Wisconsin, and a new greenhouse, built on the company's Fair Oaks property in Madison, houses the new seedlings in the late summer and fall and the parents in the winter and spring.

Seed

In 1957, about 280 crosses and selfs were made in the greenhouse. The seed of each combination was threshed out and dried and measured in a graduated cylinder. The number of seeds in 5 cc was counted and the average per cc used to estimate the number of seed in the measured lots. On this basis about one quarter of a million seeds were obtained.

New Seedlings

About 21,000 new seedlings representing 165 family lines were planted in the field on the Red Dot Research Farm. This number is a three-fold increase over the 7000 new seedlings grown in 1956. More than 1600 selections were saved for future trials. Nearly all the selections were saved because of their commercial characters, such as desirable shape and color, shallow eyes, and freedom from second growths. A few others were saved because of potential resistance to disease. In a number of the crosses and selfed lines from which commercial selections were made, one or both parents in previous tests in Maine or Idaho were resistant to verticillium wilt. Some of these may have a higher degree of resistance and they may be earlier than the breeding stocks that are available at present. Early verticillium wilt-resistant types crossed with some of the best commercial varieties should produce early maturing, wilt-resistant sorts that will fit Red Dot's farming operations better than any of the varieties now grown. The selections will be screened in the greenhouse for their reaction to verticillium wilt and some of the most promising will be tested again in the field.

In 1958, in addition to the disease-resistance tests, all selections will be grown in 10-hill rows and tested for chip quality, season of maturity, fertility and other characters of economic importance.

Ten-hill rows

In 1957, 64 seedling varieties that had been selected for superior chip quality in 1956 were grown in 10-hill rows. Field notes on maturity and fertility were secured. At harvest time those with irregular shapes and deep eyes were discarded. The tubers of the early and some of the medium-early

varieties were tested for sugar content and chip quality before storage. The late maturing and other medium-early varieties were stored at 42°F.

Forty-seven varieties that were chipped before being placed in cold storage produced chips with highly desirable color. Those in 42°F. will be chipped later in the winter.

In 1957, 221 selections made from single hills in 1956 were grown for the first time in 10-hill rows. About 125 of these were selected for further trials. The tubers of 90 of the latter that were very early, early or medium early in maturity were chipped shortly after harvest. They were tested also for sugar content and specific gravity. The tubers of the others were placed in storage at 42°F. These will be chipped later in the winter.

The tubers of 85 of the 90 selections produced chips that ranged from 80 to 90 in color; the average color of all 90 varieties was 86. A color of 80 or higher is considered satisfactory from the commercial standpoint. The correlation between sugar content and chip color was -.42. A correlation of -.42 means that on the average the increase in sugar content darkened the chip color 17.6% of the time. This would indicate that factors other than sugar content are also responsible for dark colored chips.

Specific gravity was not closely associated with chip color in the 90 varieties in this test. The correlation coefficient was +.22, indicating that these two characters were associated about 5% of the time.

Early maturing variety test

In 1957 the early variety tests were planted at about the same date as the Early Ohio was planted on the Red Dot commercial farm and harvested during the week in which the commercial crop of Early Ohios was harvested. The test included 28 varieties planted in six replications of 20 hills each. Data were obtained on maturity yield, solids and chip quality. Three varieties were as early in maturity as Early Ohio. Sixteen of the other varieties were as early as Cobbler. Two varieties outyielded Early Ohio and ten others were in the same yield class. With one exception, all varieties averaged 80 or higher in chip color. It was not surprising that acceptable chips were made from these varieties, since most of them were selected because of their high color index in 1956.

Twenty-four varieties were included in the medium and late variety tests at Rhinelander. None of the varieties outyielded the check variety Kennebec; however six other varieties were in the same yield class. The tubers of the late variety test were placed in storage at 42°F. The results of these tests will be available later.

Variety tests in Alabama

In 1957, 26 named or numbered varieties of potato were tested for yield and other characters on a Red Dot Farm at Mobile, Alabama. These varieties were planted in four replications, each replicate consisting of a single 25-hill row.

The test was planted February 5 and harvested June 4 and 5. Data were taken on yield, tuber shape and other characters. Samples of all replicates, in most cases 20 tubers of each, were shipped to Madison where the specific gravities and the chip color indexes were determined.

None of the varieties outyielded the check Russet Sebago significantly, but 13 varieties were in the same yield class as Russet Sebago. Twelve varieties were significantly higher in total solids than Russet Sebago. Only three of the 26 varieties were significantly lower than Russet Sebago in chip color.

In 1957, 90 named or numbered varieties were tested for their reaction to verticillium wilt on the Red Dot Research Farm. None of these were immune from wilt, but some seedlings showed a relatively low percentage of infection. It is interesting to note that the varieties showing resistance were those showing resistance in the Maine or Idaho tests, or are related to those showing resistance in the tests in those two States. A relatively large number of named or numbered varieties were planted to test their reactions to late blight, to scab and to black leg. In all three tests the disease epidemics were so light that the data were not conclusive.

WISCONSIN
G. H. Rieman

Potato Parental Clone Breeding

A brief review of parental-clone-breeding problems. Continuous selfing in the potato (although it can be accomplished) appears to be a too severe form of inbreeding to allow for the selection of important characters. Reduction in vigor and fertility are the most serious consequences. Plants with reduced vigor frequently fail to express adequately, for selection purposes, many desirable economic characters. The necessity of selection for male fertility greatly reduces the opportunity to select for other characters as fertility decreases in succeeding selfed generations.

Sib-mating and other less intense systems of inbreeding, such as used in animal breeding, appear to be more desirable for the cultivated tetraploid potato. This procedure is practiced, more or less, in present day potato breeding since most parental clones used in crosses show numerous causes of common ancestry. More precise methods for developing superior parental clones are needed since the number of well defined characters desired in varieties continues to increase.

The intensity of inbreeding should probably be governed by (1) the behavior of the material in regard to plant vigor and fertility and (2) the number of characters included in the selection program and the complexity of their inheritance patterns.

The experience with other crops (especially corn) emphasizes the importance of intelligent choice and/or luck in selecting suitable material for starting an inbreeding program. A survey was made of all the potato-breeding stocks grown at the Wisconsin Station in 1953 for the most promising material to start a new inbreeding program. The survey included some 12,000 clones in 180 families. The parentage of these families included named varieties and numbered clones from Wisconsin and other North Central State Stations and from U.S.D.A. A small family of 145 individuals was noted which produced 9 exceptional clones based on the following character evaluations: (1) resistance to scab, (2) immunity to virus X, and (3) resistance to non-parasitic internal tuber necrosis. Certain of these 9 clones as well as other members of this small family exhibited the following additional desirable characters: (1) high specific gravity, (2) horticultural type (both tuber and vine), (3) early to medium maturity and (4) high fertility. Certain of the 9 clones and many of the other sibling members of this family exhibited the following undesirable characters: (1) rolling leaves (similar to leaf roll), (2) flake type of tuber russetting, and (3) medium to low yielding ability. The combining ability of the 9 exceptional clones was determined by studying the behavior of progenies resulting from selfing, sib-matings and crossbreeding. Thus, two clones, X137.52 and X143.52, were selected for future inbreeding studies on the basis of both phenotypic and genotypic evaluations (Wisconsin table 1).

The stocks from the combining ability studies were useful for continuing the inbreeding program. The following potential parental clones were selected on the basis of their phenotypic appearance and the performance of the families from which they were derived: 6 first generation clones, 3 first generation sibling clones, and 6 first generation crossbred clones.

The 15 stocks listed above are all resistant to scab and immune to virus X. They were all free from non-parasitic internal tuber necrosis in a preliminary test. Family populations were sufficiently large to permit selections for other important characters including horticultural type, early to medium maturity, yielding ability and fertility.

A new population of 7,813 seedlings of similar origin have been grown in an attempt to isolate additional superior parental clones. This appeared to be desirable since the two basic clones, X137.52 and X143.52, are known to be heterozygous for genes governing the development of a number of desirable characters.

The following inbreeding program is now in progress: (1) self pollinations, first generation selfed clones and first generation crossbred clones; (2) cross pollinations, self x related self, selfs x related siblings, selfs x parent clone and selfs x related crossbreds.

Wisconsin table 1. Related virus-X-immune seedling families grown in 1956 and the number of clonal selections made during 1956 and 1957.

Sib-matings	1956 Pop.	1956 Sel.	1957 Sel.	1957 Sel.*	1957 Sel. Ratio ^{1/}
X124 x X137	201	39	11	3	14:1
X124 x X143	93	10	4	0	23:1
X125 x X137	295	58	26	5	9:1
X125 x X143	320	52	25	5	11:1
X131 x X137	407	76	28	1	14:1
X131 x X143	211	51	22	0	10:1
X141 x X137	393	45	23	4	15:1
X141 x X143	284	43	16	2	16:1
X188 x X137	151	17	2	1	50:1
X188 x X143	208	33	5	1	35:1
X143 x X137	267	26	9	3	22:1
<u>Outcrosses</u>					
B515 x X137	1103	94	42	4	24:1
B515 x X143	1301	167	80	11	14:1
B606 x X137	122	14	6	0	20:1
B606 x X143	674	63	29	5	20:1
X137 x 1301	155	12	2	0	78:1
1301 x X143	558	33	13	3	35:1
<u>Selfs</u>					
X137 selfed	266	31	7	2	30:1
X143 selfed	317	29	12	2	23:1
<u>Other sib-matings and outcrosses</u>					
X119 x X137	173	34	12	0	14:1
X179 x X137	98	11	1	0	98:1
X119 x 1301	160	13	6	0	27:1
X124 x 1301	87	1	0	0	87:0
X188 x B606	212	11	2	0	106:1
1803 x X143	279	54	31	8	7:1

* Outstanding selections

^{1/} Selection ratio = total seedling family population: number of 1957 selections.

Wisconsin table 2. U.S.D.A. potato scab nursery, Rhinelander, Wisconsin, 1957.

Selection	Rep. A. (2 hills)	Rep. B. (2 hills)	Remarks ^{1/}
Cherokee	2-2	2-2	Med. size
La. 1859	3-3	3-2	Large size
B2162-36	1-2	1-1	Small size
B 2368-13	4-3	3-3	Med. to large size
B 2874-4	3-3	2-2	Med. to small size
B 2922-26	4-3	3-3	Large size
B 3114-52	4-4	3-4	Med. size
B 3172-13	3-4	3-4	Med. to small size
B 3309-2	3-2	3-3	Med. to small size
B 3309-4	2-2	2-2	Med. size
B 3319-30	3-2	3-2	Med. size
B 3453-2	2-2	3-2	Med. size
B 3454-5	2-2	3-2	Med. to small size
B 3454-14	3-2	3-2	Small size
B 3627 ND	3-4	3-4	Med. size
B 3832-20	3-4	3-3	Med. size
B 3837-11	3-3	3-4	Med. size
B 3849-10	4-3	3-3	Med. size
B 3857-11	2-2	2-2	Med. size
B 3871-6	1-2	2-2	Med. to large (att. sample)
B 3876-25	2-2	2-2	Med. size (att. sample)
B 3897-4	2-3	2-3	Large size (early)
B 3897-9	2-2	2-2	Large size (att. sample)
B 3897-11	2-2	2-2	Med. to large size (att. deep red)
B 3903-1	2-2	2-2	Med. size
B 3964-1	2-2	2-2	Med. to large size
Irish Cobbler	3-4	3-4	Med. to large size
Russet Burbank	2-3	3-3	Med. size
Hindenburg	1-2	1-2	Med. size

^{1/} Tuber size readings have been included since we find that scab readings tend to be low (more resistant) for samples of small tuber size and high (less resistant) for samples of large tuber size.

WYOMING
W. A. Riedl and J. R. Vaughn

Potato yield trials were again conducted at Laramie, Torrington and Powell in 1957. Each trial consisted of 18 varieties and seedlings planted in one-row plots 35 to 40 feet long and replicated 4 times. The vines were dusted 2 to 4 times with a sulfur 5% DDT dust for the control of potato psyllids. The psyllid population was high in 1957 and some damage resulted in the Powell trial. The results of these trials are given in Wyoming tables 1,2,3 and 4. The tubers were graded over a 2 inch screen to obtain the yield of US No. 1's. Fifty new seedlings were grown in an observation plot at Laramie and 17 promising seedlings were increased at Laramie. Two were increased at Torrington.

Wyoming table 1. Potato variety trials, Laramie, 1957.^{1/}

Variety	Yield Per Acre		Rank of U.S. No. 1's	U.S. No. 1	Rank of U.S. No. 1	Dry Mat- ter	Rank Dry Matter
	Total	U.S. No. 1					
	Bu.	Bu.		Pct.	Pct.	Pct.	
Red Pontiac	401	330	1	82	11	19.9	16
Sheridan	374 ^{2/}	307 ^{2/}	5	82	11	22.0	4
Redglo	371 ^{2/}	310 ^{2/}	4	84	7	21.4	8
Desota	371 ^{2/}	313 ^{2/}	3	84	7	21.0	12
LaSoda	352	318 ^{2/}	2	90	1	21.4	8
Seedling W2578	342	301 ^{2/}	6	88	3	20.1	15
Progress	330	233	12	71	17	21.2	11
Teton	324	290	7	90	1	22.0	4
Kennebec	321	275	8	86	5	20.3	14
Russet Burbank	315	210	16	67	18	22.7	2
Satapa	313	262	9	84	7	20.5	13
Redbake	292	250	10	86	5	22.5	3
Yampa	280	247	11	88	3	21.8	6
Red McClure	277	215	14	78	14	21.4	8
Bliss Triumph	275	212	15	77	15	19.9	16
Cayuga	271	197	17	73	16	23.1	1
Early Gem	260	218	13	84	7	17.5	18
Dazoc	157	127	18	81	13	21.6	6
Gen. Mean	318	256		82		21.1	
L.S.D. at 5%	39	38					

^{1/} Previous Crops - 1956 - Oats, 1955 Alfalfa.

^{2/} Statistically equal to highest yield.

Date Planted - May 27; Date Harvested - Sept. 25; Dusted with sulphur and 5% DDT July 8, 24, August 10 and 19; Irrigations - July 29, Aug. 13 and 20 and Sept. 5; Frosts - Light frost Sept. 1, Sept. 11, and froze Sept. 20; 1-row plots 40 feet long with 4 replications. Highest yield.

Wyoming table 2. Potato seedling yield trial, Laramie, 1957.^{1/}

Variety or Seedling	Yield per acre		Rank of		Rank of		Dry Mat- ter	Rank Dry Matter
	Total	U.S. No.1's	U.S. No.1's	U.S. No.1's	U.S. No.1's	U.S. No.1's		
	Bu.	Bu.		Pct.		Pct.		
W-2650	433	374	1	86	9	20.3		7
W-2598	358	310	2	87	6	19.3		15
W-2662	356	297	3	83	14	22.0		3
Bliss Triumph	353	282	8	80	17	19.9		11
W-2550	344	297	3	83	14	22.5		2
W-2541	343	297	3	87	6	19.5		13
W-U15	337	290	6	86	9	20.1		9
W-2578	323	290	6	90	1	20.1		9
W-2565	304	260	9	86	9	20.3		8
W-2556	281	243	10	86	9	19.0		16
W-2722	281	219	15	78	18	22.9		1
W-U29	276	243	10	88	4	21.6		4
W-U43	267	240	12	90	1	19.7		12
W-2687	263	216	16	82	16	19.5		13
W-2542	260	234	13	90	1	21.1 ^{2/}		5
W-2688	254	216	16	85	13	-----		-
W-2548	251	222	14	88	4	20.5 ^{2/}		6
W-2674	181	157	18	87	6	-----		-
General	304	260		86		20.5		
L.S.D. at 5%	53	48						

^{1/} Previous Crops - Oats, 1956 - Alfalfa, 1955.

^{2/} Discarded before specific gravity test was made.

Date planted - May 28; Date Harvested - Sept. 25; Dusted with sulphur and 5% DDT July 8, 24, Aug. 10 and 19; Irrigations - July 29, Aug. 13, 20 and Sept. 5; Frosts - Light frost Sept. 1 and 11, Killing frost Sept. 20; Size of Plots - 1-row plots 40 feet long with 4 replications.

Wyoming table 3. Potato variety trial, Torrington Substation, 1957.^{1/}

Variety or seedling	Yield per acre		Rank		Rank		Dry 2/ matter	Stand
	Total	U.S.	U.S.	U.S.	U.S.			
		No.1	No.1	No.1	No.1	No.1		
	Bu.	Bu.		Pct.		Pct.	Pct.	Pct.
W-2550	688	593	1	86	6	22.5		79
LaSoda	653 ^{3/}	572 ^{3/}	2	88	2	21.4	^{4/}	79
W-2483	619 ^{3/}	504 ^{3/}	4	81	12			82
Redglo	593 ^{3/}	463 ^{3/}	11	78	15	21.4		81
Bliss Triumph	584 ^{3/}	472 ^{3/}	8	81	12	19.9		85
Red Pontiac	574 ^{3/}	496 ^{3/}	5	86	6	19.9		86
W-2598	572 ^{3/}	508 ^{3/}	3	89	1	19.3		77
W-2578	555	480	6	86	6	20.1		74
W-2541	550	472	8	86	6	19.5		86
W-2556	544	475	7	87	4	19.0		92
W-2688	544	472	8	87	4		^{4/}	46
Sheridan	525	436	12	83	10	22.0		67
Early Gem	491	337	16	69	18	17.5		76
Redbake	486	429	13	88	2	22.5		46
W-2565	477	389	14	82	11	20.3		74
Progress	460	372	15	81	12	21.2		56
W-2548	394	309	17	78	15	20.5		59
Cayuga	379	283	18	75	17	23.1		90
General mean	538	448		83		20.6		74
L.S.D. .05	118	108						

^{1/} Previous crop, Alfalfa; planted, June 4; harvested, September 11. Killing frost September 22. Plot size, 1-row plots, 35 feet long, replicated 4 times.

^{2/} Dry matter - from Laramie trial.

^{3/} Statistically equal to highest yield.

^{4/} Discarded before specific gravity was determined.

- Highest yield.

Wyoming table 4. Potato variety trial, Powell Substation (Cody Farm), 1957.

Variety or seedling	Yield per acre		Rank		Rank		Rank
	Total	U.S.	U.S.	U.S.	Dry matter	dry matter	
		No.1	No.1	No.1			
	Bu.	Bu.		Pct.		Pct.	Pct.
LaSoda	356	274	1	77	15	21.4	8
Red Pontiac	338 ^{2/}	274 ^{2/}	1	81	13	19.9	14
W-2650	315 ^{2/}	258 ^{2/}	4	82	10	20.3	11
W-2662	299 ^{2/}	266 ^{2/}	3	89	3	22.0	5
Bliss Triumph	282 ^{2/}	237 ^{2/}	5	84	5	19.9	14
W-2578	274 ^{2/}	235 ^{2/}	6	86	4	20.1	13
W-2550	274 ^{2/}	229 ^{2/}	7	84	5	22.5	3 ^{2/}
W-2688	242	192 ^{2/}	10	79	14	^{3/}	^{2/}
W-2598	235	197 ^{2/}	9	84	5	19.3	16
W-2565	222	199 ^{2/}	8	90	2	20.3	11
Early Gem	219	180	11	82	10	17.5	17
Russet Burbank	204	136	14	67	18	22.7	2
Redglo	188	156	12	83	8	21.4	8
Sheridan	172	143	13	83	8	22.0	5
Progress	164	134	15	82	10	21.2	10
W-2722	144	108	16	75	16	23.1	1
Dazoc	108	79	18	73	17	21.6	7
Redbake	104	97	17	93	1	22.5	3
Mean yield	230	189		82		21.0	
L.S.D. .05	95	87					

— Highest yield.

^{1/} From Laramie trial.

^{2/} Statistically equal to highest yield. Planted May 30 and harvested Oct. 7.

^{3/} Discarded

Potato breeding. The potato-breeding work consisted primarily of crossing high-yielding red-skinned varieties and seedlings with scab and ring-rot, resistant seedlings having high specific gravity. Twenty-five seedling families were grown at Laramie. A large number of promising selections were made for further observation.

Uniform Potato Scab Nursery. The uniform potato scab nursery was again conducted at Laramie. Development of scab was very limited in the plots in 1957. Of the six checks included in the test only two had any scab and both of these had a small percent of area infected. It was interesting to note that several of the red seedlings showed good scab resistance. The results are shown in Wyoming table 5.

Wyoming table 5. U.S.D.A. potato scab nursey, Laramie, 1957.

Selection	Replication 1		Replication 2	
	Type	Area	Type	Area
	Scab	Covered Pct.	Scab	Covered Pct.
Cherokee	0	0	0	0
La 1859	1	Trace	0	0
B 2162-36	1	Trace	3	1
B 2368-13	0	0	0	0
B 2874-4	0	0	0	0
B 2922-26	0	0	1	Trace
B 3114-52	2	5	1	Trace
B 3172-13	1	5	1	1
B 3309-2	1	1	0	0
B 3309-4	0	0	1	Trace
B 3319-30	1	Trace	1	Trace
B 3453-2	1	Trace	1	Trace
B 3454-5	1	Trace	1	Trace
B 3454-14	3	1	2	1
B 3627-ND	1	Trace	1	1
B 3832-20	0	0	1	Trace
B 3837-11	1	Trace	1	Trace
B 3849-10	1	Trace	1	Trace
B 3857-11	2	5	1	1
B 3871-6	2	20	2	Trace
B 3876-25	1	Trace	1	Trace
B 3897-4	1	Trace	1	5
B 3897-9	1	Trace	1	Trace
B 3897-11	0	0	0	0
B 3903-1	0	0	0	0
B 3964-1	0	0	2	Trace
Check 1	0	0	0	0
Check 2	3	5	0	0
Check 3	4	5	0	0

Percent marketable tubers was not taken because all except 2 of the check plots were 100% marketable as far as scab was concerned.

CANADA (Ontario)

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Potato variety and seedling trials have been conducted cooperatively in the Province of Ontario by the Field Husbandry Department, Ontario Agricultural College and Horticulture Division, Central Experimental Farm, Ottawa, since 1936. During the 1957 growing season in Ontario, rainfall was heavy to excessive in May and June but much below normal during July and the first two weeks of August. Where irrigation facilities were not available, the yields were much below those of 1956 and the quality was lowered.

Ontario Regional Trial

Ten potato seedlings or varieties were tested in comparison with the two standard varieties, Irish Cobbler and Katahdin, at eight locations in Ontario as shown in Ontario Tables 1 and 2.

The varieties Tawa, F 4949, Delus, Plymouth and G 2505-37 have only been included for one year and will be repeated in 1958. F 503 and Saco have been tested regionally for two years. F 503 will be retested again in 1958 but it is doubtful if Saco merits further trial because of its very irregular tuber shape and susceptibility to second growth when a sustained drought occurs. Three varieties, Nordak, Dazoc and G 2213-175, have been tested regionally for three successive years. Their characteristics, as shown in the Ontario Regional Trial, are as follows:

Nordak - matures earlier than Cobbler, good tuber type, shallow eyes, fair yielding ability, low to medium solids content, cooks very white. Its sister selection, Norgleam, has had two years in the Regional Trials and might well replace Nordak in this trial in 1958 as it is somewhat superior in certain characteristics.

Dazoc - matures with Cobbler, tubers are somewhat like Cobbler in type but not so deep in the eye, skin is an attractive dark red in color. The solids are generally lower than Cobbler but Dazoc tubers cook very white and have excellent flavor. Dazoc outyields Cobbler although it usually produces a fair quantity of under-sized tubers due to its exceptionally high set. Dazoc has some scab resistance, especially to superficial scab but is quite susceptible to late blight. It stores fairly well where temperatures are controlled.

G 2213-175 - matures earlier than Katahdin, produces uniform, shallow-eyed, clean tubers but the shape is flattened. Similar to Katahdin in solids and cooking quality but superior in yield, scab and late blight resistance. It has performed very well in Northern Ontario Trials. It may not merit further testing, yet has some superior characteristics.

Ontario table 1. Ontario Regional Potato Variety Trials: Summation of Marketable Yields in Bushels Per Acre and Total Solids Contents of Tubers in Percent, 1957.

Variety	Harrow	O.A.C.	Dufferin	Simcoe	Bradford	Temiskaming	Fort William	Variety Means
	Sand Loam 1/	Sand Loam 1/	Silt Loam Sand	Sand Loam	Muck	Sand Loam 2/	Loam 2/	
	Mean Yield	Mean Yield	Mean Yield	Mean Yield	Mean Yield	Mean Yield	Mean Yield	
	Total Solids	Total Solids	Total Solids	Total Solids	Total Solids	Total Solids	Total Solids	
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.	
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	
Nordak*	256	435	263	196	16.0	52	346	17.8
F 503	322	377	277	253	17.9	63	374	19.6
Dazoc	326	426	295	260	18.5	43	301	18.6
Irish Cobbler	392	515	292	388	18.5	25	320	19.5
Tawa	327	452	232	257	18.5	32	269	18.6
F 4949	453	483	248	239	17.5	78	337	18.1
Delus	438	541	327	514	21.3	122	370	21.4
G 2213-175	492	611	337	397	17.9	166	412	18.4
Plymouth	452	565	287	299	19.4	77	401	19.0
Katahdin	495	535	329	430	19.0	57	279	18.8
Saco	653	696	434	430	19.2	176	403	20.0
G 2505-37	464	708	375	484	21.3	110	320	20.8
Station Means	423	529	308	346	18.8	83	346	19.2

* arranged in approximate order of maturity
 1/ - irrigated
 2/ - very dry season

Ontario table 2. Ontario Regional Variety Trials, 1957:
Summation of the Cooking Trial Ratings of Texture, Flavor and Color^{1/}

Variety	Harrow		O.A.C.		Dufferin		Simcoe		Bradford Marsh		Temisk- aming		Fort William		Variety Totals	Total Cooking Scores
	Sand	Loam	Sand	Loam	Silt	Loam	Sand	Loam	Muck	C.	Sand	Loam	Sand	Loam		
	T ₂ /F ₃ /C ₄	T.	F.	C.	T.	F.	C.	T.	F.	C.	T.	F.	C.	T.	F.	C.
Nordak	3	5	5	4	5	5	4	4	4	5	5	5	5	3	25	34
F 503	4	5	4	4½	5	4½	4	4½	4½	5	4	4	4	4	30	32
Dazoc	3	5	5	4	5	5	3	4	4½	5	4	4	4	3	26	31½
Irish Cobbler	4	5	4	4½	5	4½	4	5	5	5	4	5	3	3	28	33½
Tawa	3	4	4	4	4½	4	4	4	4	5	4	4	3	3	26	28½
F 4949	3	4	4	4	4½	4	5	5	5	4	5	5	4	3	25	31½
Delus	4½	5	5	4½	5	5	5	5	5	5	5	5	5	5	32½	33½
G 2213-175	3	5	5	3½	5	4½	4	4	4	4	4	4	3	3	25½	32
Plymouth	3	3	4	4	4½	4½	4	5	5	5	4	4	3	3	25	25½
Katahdin	4	4	4	3½	5	4½	4	4	4	5	5	5	3	3	25½	31
Saco	4½	5	5	4½	5	5	5	5	5	5	4½	5	5	5	31	33½
G 2505-37	4	4	4	4½	5	4½	4	4	4½	5	4	5	4½	5	32	34
Station totals (60)	43	54	53	49½	58½	51	53	55	52	46½	54½	57	47	53½	59	51
	43	54	53	49½	58½	51	53	55	52	46½	54½	57	47	53½	59	51

1/ - Ratings: 5 - most desirable
1 - least desirable
2/ - Texture (mealiness)
3/ - Flavor
4/ - Color

Ontario table 3. Replicated Adaptation Trial of United States Introductions, O.A.C. Potato Farm, 1957.

Seedling or Variety	Years in Trial	Mat- ure	Marketable Yield	Total Solids	Cooking Trial					Stor- ing	Uniform- ity	Tuber Disease Ratings			
					Tex.	Fla.	Col.	Ing	ity			Scab	L.B.	Rhiz.	Scurf
			Bu.	Pct.	Pct.	5	5	5	5	5	5				
Norgleam	1	VE	424	81	17.8	3½	5	4½	4	3½	2 s	Tr.	Tr.	2	
Cobbler	Std.	E	506	91	19.2	4	5	4½	5	2½	3 s	0	Tr.	3	
Wisc. 1429	2	ME	348	79	18.6	4	4	2	2	3	1 s	0	0	3	
Antigo	1	ME	458	86	18.0	3½	5	4	5	3	1 s	1	0	2	
Sheridan	2	ME	424	80	18.1	3½	4½	5	4	3	1 s	1	Tr.	Tr.	
Redkote	1	M	605	89	17.8	3½	5	4	3	4	1 s	1	0	0	
Teton	2	M	176	72	18.0	3	4½	4	4	4	0	0	Tr.	1	
B 595-76	1	ML	168	67	21.1	4	4½	4	5	2½	1 s	0	Tr.	2	
Katahdin	Std.	L	357	83	18.7	4	5	4½	5	3½	3 s,d	3	0	3	
Yampa	1	L	352	83	19.8	4	5	3½	5	4	1 s	2	1	3	
Merrimack	1	L	439	87	21.8	4½	5	4	5	3	1 s	0	1	1	
Russet Sebago	2	L	368	84	19.5	3½	5	4½	2½	3	1 s	0	Tr.	3	
Boone	2	VL	560	86	19.4	4½	5	5	3½	2	1 s	0	0	2	
B 355-35	1	VL	516	86	20.1	4	4½	3	5	2	2 s	0	0	4	

Mature: E - early Cooking, Storing and Uniformity: Tuber Disease Ratings: Bu. - bushels/acre

M - medium

L - late Rating of 5 - most desirable Tr. - trace (less than 1% d - deep or pitted

V - very 1 - least desirable

0 - none s - superficial L.B. - late blight

1 - 1 to 5% 2 - 6 to 11% Rhiz. - rhizoctonia

3 - 12 to 25% 4 - 26 to 40% Scurf - silver scurf

Ontario table 4. Adaptation Trial of Potato Varieties and Seedlings Introduced from the United States, Grown at the O.A.C. Potato Farm, 1957.

Variety or Seedling	Years Tested	Matur- ity	Scab Rat- ing	Total Solids	Dispos- ition D or R	Remarks
Pct.						
Neb. 223.48-1x	2	VE	Tr.	19.0	R	Clean tubers
White Cloud	5	ME	3	19.6	D	Scabby
Redbake	2	ME	2	19.6	R	Sprouted early
Osage	4	ME	1	18.7	R	Suscept. hollow heart
Waseca	5	ME	2	17.0	D	Rough
Red Beauty	2	ME	2	17.5	R	Very uniform
Redburt	2	M	1	17.9	D	Rough
Progress	2	M	3	18.5	D	Rough
Redglo	2	M	2	18.1	R	Dark red
ND 2231-2	4	M	2	20.4	R	Excellent quality
Neb. 91.47-1	2	ML	Tr.	19.4	R	Clean & uniform
Columbia Russet	2	L	1	20.2	R	Excellent quality

Grown in Isolation

Received from Dr. A. E. Kehr

I 801-10	1	VL	0	20.8	R	
I 803-1	1	ML	0	18.1	R	
I 1092-2	1	M	0	18.5	R	
I 1111-10	1	L	0	19.6	R	Very uniform
I 8140-1	1	VL	0	19.0	R	
I 961-1	1	M	Tr.	18.5	R	

Received from Dr. N. R. Thompson

Ia 1037-1	1	M	1	18.7	R	
Ia 1106-5	1	M	Tr.	19.4	R	
Ia 1109-9	1	M	0	18.7	R	Very uniform
Ia 1111-5	1	M	0	19.0	R	
Ia 1111-8	1	L	Tr.	20.0	R	
Ia 1111-20	1	E	0	20.6	R	
R 123-9	1	L	1	16.2	R	
R 139-9	1	M	1	18.1	R	

Received from Dr. Ora Smith

Russet Cherokee	1	ML	0	18.7	R	
Rukat	1	L	0	16.4	R	Cooked pure white

Received from Dr. F.I. Lauer

Minn. 355	1	ME	Tr.	20.2	R	Med. deep eyes
Minn. 11	1	L	0	16.6	R	
Minn. 12	1	ME	1	18.5	R	Trace of tuber blight
Minn. 20	1	M	0	20.2	R	

Received from Dr. J.C. Miller

La 91-143	1	L	0	17.9	R	
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Ontario table 4, continued.

Variety or Seedling	Years Tested	Matur- ity	Scab Rat- ing	Total Solids Pct.	Dispos- ition D or R	Remarks
<u>Received from Dr. H.O. Werner</u>						
Neb. 41.49-4	1	M	0	18.1	R	
Neb. 29.47-2	L	VL	1	16.2	R	
Neb. 77.44-1	1	E	0	17.7	R	
Neb. 83.49-1	1	VE	0	20.2	R	
Neb. 107.52-1	1	ML	0	16.2	R	Deep eyes
Neb. 131.50-2	1	ML	0	18.1	R	Very uniform
Neb. 215.50-2	1	ML	Tr.	17.7	R	
Neb. 226.19-1x	1	L	0	17.0	R	
Neb. 315.48-3x	1	M	1	18.7	R	
Neb. 76.50-3	1	E	0	17.5	R	
Neb. 95.48-1	1	L	0	16.6	R	Very uniform
Neb. 156.52-2	1	E	0	16.4	R	
Neb. 181.51-2	1	E	0	19.4	R	
<u>Received from Dr. R.H. Johansen</u>						
ND 2774-3R	1	M	0	17.7	R	Very smooth tubers
Norland	1	E	0	16.6	R	
ND 3324-2	1	E	0	19.4	R	
<u>Received from Dr. R.V. Akeley</u>						
B 605-10	1	ME	1	20.6	R	Excellent quality
B 721-35	1	ME	0	17.3	R	
B 922-6	1	M	Tr.	18.7	R	
B 2894-24	1	L	0	17.3	R	
B 3095-18	1	M	0	17.3	R	
B 3114-67	1	M	Tr.	17.3	R	
B 3299-1	1	ML	0	17.5	R	
B 3309-2	1	M	1	15.4	R	
B 73-3	1	ML	0	19.2	R	Very good quality

No. Tested - 58

Retained - 54

I - Iowa Ia - Iowa (but received from Michigan)

R - Michigan Seedlings La - Louisiana Neb. - Nebraska

ND - North Dakota Minn. - Minnesota B - Beltsville (U.S.D.A.)

BRAZIL

Horticultural Experimental Station,
Domingos Petrolini, Rio Grande do Sul.
F. F. Guimaraes

Resistance to Pseudomonas solanacearum

Resistance to southern bacterial wilt or brown rot has been reported in S. pinnatisectum var. heptazygum, S. sambucinum, and S. andigenum - S. tuberosum hybrids in the 25th Annual Report on page 37, by Dr. L. W. Nielsen. The data presented in Brazil table 1 are our results for 1957 based on observations of a minimum number of 50 tubers for each selection. The disease infestation was very severe over all the field in which the selections were tested. Special attention should be given to the American seedling B 2969-15 which never showed any sign of the disease during 8 cropping seasons and to another American seedling B 3159-1, that only in one season out of 8 exhibited 2 percent infection.

Brazil table 1. Selections that showed little or no susceptibility to P. solanacearum (brown rot).

Variety	Parentage	Approximate amount of
		<u>P. solanacearum</u> Pct.
Ac. 25892	-----	4
Ac. 25920	-----	4
Aquila No. 5	(Wildrasse x Kultursorte)	8
B 929-23	(X-792-88 x B 81-40) I-2193	8
B 2921-4	(B 607-56 x 528-570)	9
B 2966-6	(B 922-6 x Aquila) I-2234	6
B 2969-15	(B 1153-10 x B 878-28) I-2236	0
B 3159-1	(B 899-25 x B 1153-10) I-2282	0
Frühadel	BRA St IV	8
Petrolini 51	(Lichtblick x Earlane)	8
Petrolini 112	(Guculus x 96-56)	8
Suevia	(Wildkartoffel x Kultursorte)	6
A-806-1	(de Cardinal selfed)	2
A-1130-1	(de B 922-3 selfed)	4
X-547-5	(B 76-43 x A-284-S ₁)	4
X-598-4	(X-112-3 x X-46-8)	9
X-614-1	(X-165-3 x A-28-4-S ₁)	2
X-635-2	(Kolobrezeskie x A-28-4-S ₁)	3
X-639-5	(Konsuragis x A-328-1)	8
X-661-1	(A-427-1) x (X-368-12)	8
X-781-9	(HLT-4) x B 929-32	2
X-787-16	(B 606-37 x Saranac)	6
C-826-2	(X-368-18 x Jakobi)	6
CI-830-3	(X-383-11 x S. Rybinii)	2
C-865-3	(B 936-12) x Jakobi	6

MEXICO

John S. Niederhauser, Javier Cervantes,
and Keith Graham

Report on 1957 Toluca (Mexico) Field Test for Late Blight Resistance
of Seedlings Sent by Robert V. Akeley

Planted: May 31 - June 1, 1957. Harvested: September, 1957

Planting plan: Small whole tubers, planted 50 cm. apart in row, 25 plants per row. Check variety Alpha planted at each end of each row. 3,038 seedlings, representing 26 families, were planted in the field at the Santa Elena Experiment Station near Toluca.

Cultural Methods: Fertilizer applied at time of rowing out, 1.2 tons of 6-12-6 per hectarea. No fungicides were applied during the entire season. DDT was applied 4 times (about 2 kg. per hectarea of 75 percent wettable powder).

Seasonal Notes: Late blight appeared late this season (for Toluca), probably due to unseasonably dry weather during June. First blight lesions were noted in this field on checks on July 13. Checks (variety Alpha) were completely dead on August 5.

The late blight reading made on August 19 - 21 was taken as final. The same scale (0 - 5) was used as in previous years: 0, no infection; 1, very few lesions (1 - 5); 2, slight infection; 3, moderately blighted (up to 50 percent foliage); 4, severely blighted, and 5, dead.

Mexico table 1. Field test for late blight resistance, USDA seedlings, Tuluca, Mexico, 1957.

Our No.	U. S. No.	Parentage	Late Blight Readings, August 19-21, 1957					
			0	1	2	3	3+	4-5
295	B 4344	Houma x Ac. 25953						58
296	B 4345	HSO-2 x Earlane						42
297	B 4346	HSO-2 x Ac. 25956						55
298	B 4347	Menominee x Ac. 25953			1	5		300
299	B 4348	Mohawk x Ac. 25953						104
300	B 4352	Sebago x Ac. 25953						51
301	B 4353	TI-5 x B 3403-10						20
302	B 4354	TI-5 x Ac. 25953				3		140
303	B 4355	TI-5 x Ac. 26031			1	7	6	216
304	B 4356	TI-5 x Ac. 26033				1		45
305	B 4357	(X96-56) x Ac. 25953				1		67
306	B 4359	B 595-76 x Ac. 25953						30
307	B 4360	B 595-76 x Ac. 26031			1		1	34
308	B 4362	B 922-3 x (X96-56)						161
309	B 4363	B 922-6 x Ac. 26031				7	4	119
310	B 4365	B 3641-18 x Ac. 25953						49

continued

Mexico table 1, continued.

Our No.	U. S. No.	Parentage	Late Blight Readings, August 19-21, 1957					
			0	1	2	3	3+	4-5
311	B 4366	B 3707-4 x Ac. 25953				1		11
312	B 4367	B 3707-4 x Ac. 26031						29
313	B 4368	B 3720-9 x Ac. 25953						26
314	B 4369	41756 x Ac. 25953				2		78
315	B 4370	Ac. 25953 x TI-5				4		67
316	B 4371	Ac. 25976 x HSO-2				2	2	347
317	B 4372	Ac. 25977 x HSO-2			2	22	2	765
318	B 4373	Ac. 25977 x Katahdin			2	3		108
319	B 1528	TI-5 (x)						7
320	B 1530	B 922-6 (x)						29
Total					7	58	15	2958

NEW SOUTH WALES (Australia)
W. Poggendorff

Performance Report of U.S.A. Varieties

Pungo: Blocky squarish tubers, whose medium-depth eyes produce a slightly rough appearance. Nice brown russet skin, very tough. Cut very well except for very slight brown fleck in 1 out of 3. Early to mid season in maturity. Yield quite good. General impressions of this seedling was quite good.

Plymouth: Quite attractive tubers with a firm russet skin. Eyes shallow, brow medium prominent. Oblong flattened in shape, possibly a little too flat. Early in maturity. Yield average. Nice white flesh 1 out of 3 very slight brown fleck. Also a very small amount of second growth. Though the tubers of this variety may be a little too flat, it nevertheless looked as if it may be useful.

Delus: Only a fair yield but a good sample generally. Bumpy at eyebrow in larger tubers. Short blocky tubers. Eyes shallow to medium. One out of 4 very slight brown fleck. Smooth creamy white skin. Maturity early to mid season. General impression good.

Cherokee: Reasonable yield only. Larger tubers too rough due to bumpy eyebrows. Smaller tubers quite nice. Eyes of medium to shallow depth. Beautiful cutting quality. Early maturity. General impression of this variety was not favorable. Possibly with closer spacing and heavy fertilizing better results may ensue.

Keswick: Not a high yield. Tubers slightly rough appearance. Rather medium to deep eyes. Blocky squarish shape. White skin. Cut very nicely. Mid season maturity. The yield of this variety would need to be greater.

X927-3: Fair yield of flattish-oblong tubers. Too much seed, otherwise a nice sample. Purplish pigment in mature tubers. Good cutting quality. This seedling should be very useful, due to its resistance to scab and leaf roll, and quite good quality.

Teton: Fair yield. Flattened oval tubers, with shallow eyes. Firm skin. Some growth crack. Hollow heart. Could be useful as parent.

B73-3: Only a fair yield. White skin, shallow eyes well distributed over the tuber. Brow medium prominent. Flattish oblong. Somewhat irregular. General impression not favorable.

Canso: Not a high yield but an excellent sample of nice shallow eyed slightly flattened tubers. Slightly netted skin. Very slight trace of brown fleck in 1 out of 6, otherwise excellent cutting quality. General impression most favorable. Yield will probably have to be higher.

B2368-4: A good yield. Tubers too rough due to deep eyes. Three out of 4 brown fleck. Nice red skin. Will be no good as a variety but should be most useful as a parent.

Merrimack: Quite a good yield of round to blocky tubers. Eyes shallow to medium. Brown, slightly netted skin. Very good cutting quality. Mid season. General impressions most favorable will be increased.

B75-4: Yield low. Nice firm brown skin. Couple pear shaped. Slight growth crack. Shallow eyes. Good cutting quality. Early maturing. General impression quite favorable except for low yield.

B922-6: Yield low. Buff skin, shallow eyes, round to blocky. Very nice white flesh. Some tubers resemble Katahdin. Will be used a lot as a parent because of its multiple blight resistance and good quality.

B24-58: Yield medium. Shallow eyes, flattish shape, buff skin. Slightly creamy flesh. Cut quite crisply. Should be useful as a leaf roll resistant parent.

Saco: Quite a good yield. Sample not as good as it could be, brow bumpy, eyes medium. Roughish and irregular in appearance. Clean very smooth skin. Should be useful as parent because of multiple-disease resistance. Has some possibility as a variety.

Early Gem: Yield low. Tubers slightly elongated, with a heavily russeted skin. Some severe growth cracking. Hollow heart 1/2. Some second growth. Not at all promising.

NEW ZEALAND (Christchurch)

R. G. Robinson

Necessity for a breeding plan. In 1936 when breeding commenced, New Zealand had 28 varieties in the Government Certification Scheme. Many of these were susceptible to blight and in other characteristics were not satisfactory varieties. New Zealand's potato growing areas extend from Kaitia in the North Island to Tuatapere in the South Island - nearly from sub-tropic to cool temperate conditions. Soil conditions vary considerably; weather is more variable. Some districts are practically frost free throughout the year - other districts have only a few months free from frost. Rainfall ranges from 70-80 inches per year down to 25-30 inches. Droughts are met with fairly regularly in the Canterbury Plains, the main growing area in the South Island. These wide variations in soil and climatic conditions require a wide range of varieties suited to the particular conditions. The most important characteristics to breed for appeared to be resistance to late blight, drought resistance, and possibly frost.

Breeding material available at commencement of plan. The varieties in New Zealand had been augmented by the American Chippewa, Katahdin and Sebago. Pure seed of the wild species S. demissum and S. Acaule - also tubers of the semi-cultivated Mexican variety Luqui - were received from Germany.

The first three years of potato breeding consisted of crossing Katahdin, Chippewa (ample pollen), Arran Pilot and Sebago (scant pollen) with S. demissum and S. Acaule and commercial varieties. A number of crosses were successful, except with S. Acaule.

Collection of material from School of Agriculture, Cambridge. In 1938 a large collection of seeds was received from the School of Agriculture, Cambridge, England. These were sent by Miss Cecilia F. O'Connor who was carrying out plant breeding at Cambridge for a number of years. These consisted of pure breeding seeds of wild species, hybrids, seeds from crosses between wild and semi-cultivated varieties and commercial varieties. Miss O'Connor intimated there would be every possibility of some blight and/or frost resistant seedlings available from the seeds supplied. This collection turned out to be very valuable and further crosses were made in an endeavor to secure blight, drought and frost resistant seedlings up to commercial standard.

New material from overseas. The U.S.A. Department of Agriculture supplied promising varieties some of which were useful for breeding, having ample fertile pollen. Dr. F. J. Stevenson also personally arranged for supplies of new varieties. Seedlings were also received from the Department of Agriculture, New South Wales, Australia, Dr. E. M. Hutton of the Commonwealth Scientific and Industrial Research Organization, Canberra, Australia. The Crop Research Division supplied tubers of semi-cultivated and wild species from South America.

Facilities for testing for necessary characteristics. No breeding has been done especially for resistance to virus disease. Any seedlings which deteriorate quickly are discarded.

Scab resistance. Varieties such as Yampa and Teton have been used in breeding for scab resistance, but no promising seedlings have been secured up to the present.

Blight resistance. Field testing was the only one that could be carried out during the war and for some years after. Later, when Mr. C. M. Driver arrived back from England, he commenced work on potatoes at the Crop Research Division and in recent years Mr. Driver has tested our material in the laboratory. In the last four years, seedlings have been included in a blight resistant test carried out by the Department of Agriculture. The seedlings, along with all commercial varieties and some of the Crop Research Division's seedlings, are grown unsprayed in a district that is always subject to blight.

Drought and frost resistance. Field observations are used to test for these characteristics.

Cropping capacity. Tubers are sent to many parts of New Zealand for inclusion in small trials, and the Department of Agriculture accept seedlings for test in their extensive trials. Tests against the main commercial varieties are carried out at Robinson's trial grounds at Methven (Canterbury Plains).

Results. Two new varieties have been bred - one named Glen Ilam, a main crop which has excellent drought resistance and is the heaviest cropping variety in New Zealand. This variety is a cross between Catriona (an English variety) and Chippewa. Glen Ilam has two faults - it is subject to Mosaic - and if not grown on the right type of soil has the tendency to develop brown fleck. Fortunately, a small area of virus free Glen Ilam is being multiplied and this should help to overcome the problem of virus. The other variety involved is Ilam Hardy. This is a cross between Arran Pilot and Chippewa. Ilam Hardy has the good quality of forming tubers quickly during the short days of winter and is grown extensively for early digging. It is also planted in the spring as a second early crop and for main crop production. The quality of this variety is always good, and only under exceptional circumstances will the tubers grown hollow. It is not subject to brown fleck. The area of this variety entered in Government Certification test for 1956-57 is close to 400 acres. At present (March, 1957) there are a number of promising seedlings that have been bred from the South American species. Some of these have the Katahdin or Chippewa strain in them.

Conclusion reached after twenty years of potato breeding. The greatest value to New Zealand in the South American species is their drought resistance. Frost resistance is difficult to incorporate in a seedling that measures up to New Zealand's requirements in quality and general appearance. The value of blight immunity is doubtful. Some seedlings that were immune to two strains of blight were badly and quickly affected by new strains being involved. Good cooking quality has up till recently been lacking in potato varieties bred from South American species. Later seedlings back crossed to Katahdin, Chippewa and high quality seedlings may be satisfactory. New Zealand might be better served with a variety carrying genes for field resistance to late blight or which are slow to go down to blight after being affected. Commercial growers in districts where blight is likely to occur are well organized to spray regularly, and varieties mainly used in these districts - namely Suttons Short Top, Sebago, Glen Ilam and Ilam Hardy - are giving good results. A new variety must measure up to, or be superior to these good potato varieties.



